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In This Issue: S. A. E. Aeronautic Meeting and National Air Races

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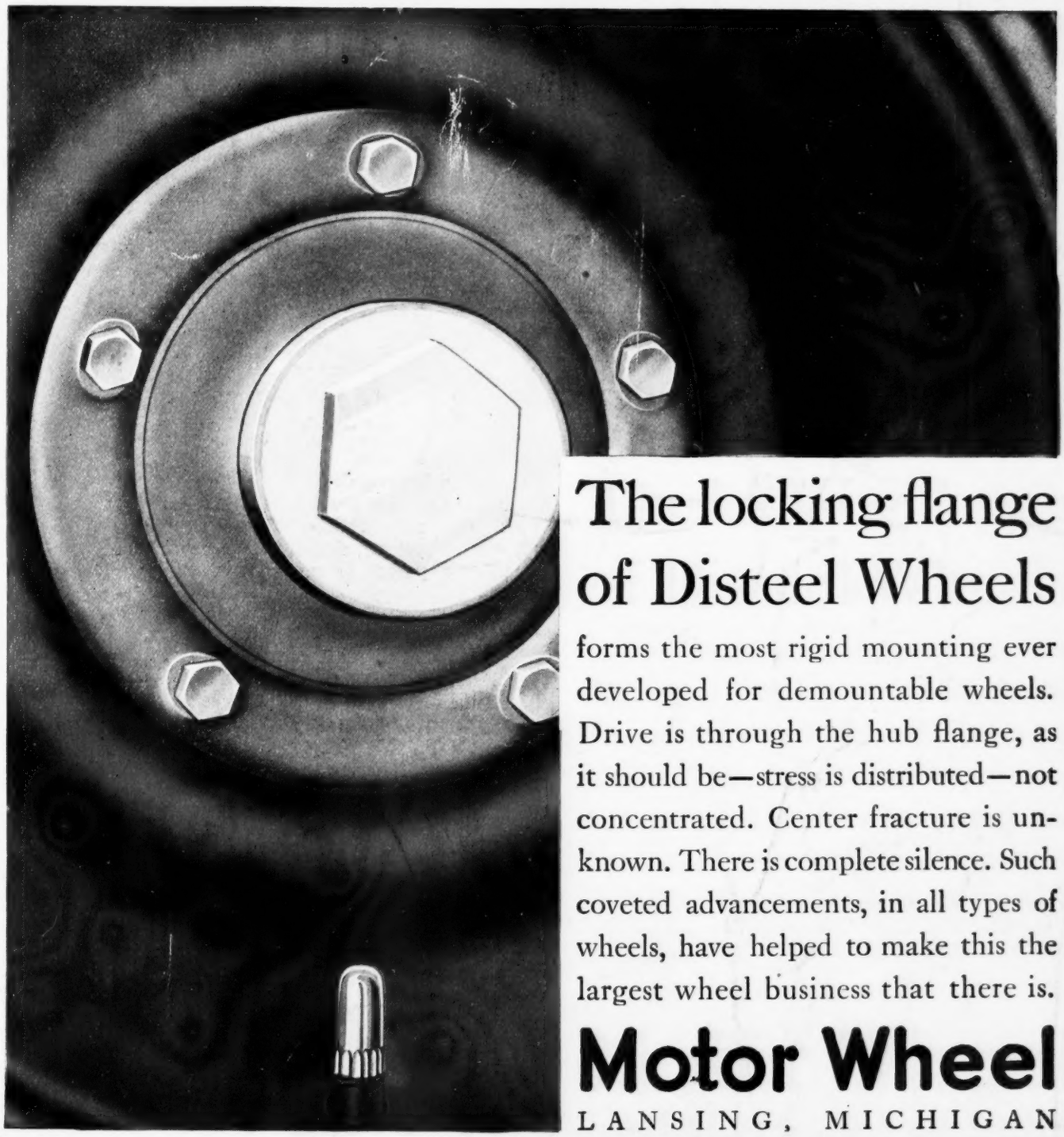

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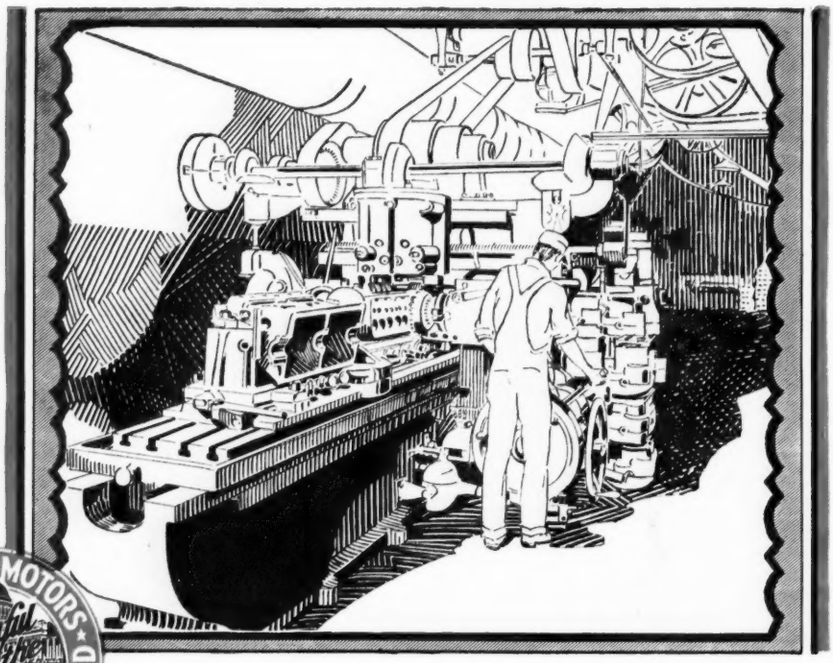

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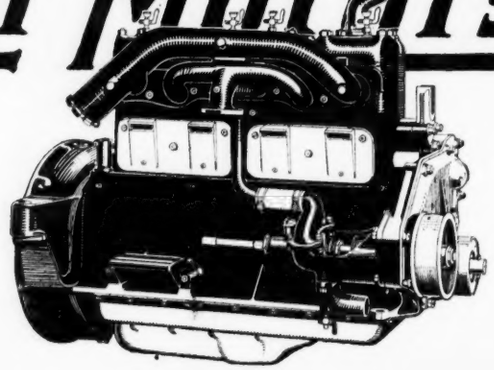


AUTOMOTIVE INDUSTRIES

VOLUME 55 *Philadelphia, Thursday, September 9, 1926* NUMBER 11

Air-Cooled Engine Has "Arrived," View of Airplane Experts

Engineers at S. A. E. aeronautic meeting think power plants of this type will prove suitable for requirements up to 600 hp. Many other topics discussed.

By Leslie S. Gillette

THE highly favorable opinion of air-cooled engines for airplanes in the 250-300 hp. class voiced by an unusually large number of engineers was the outstanding feature of technical interest developed at the annual aeronautic meeting of the Society of Automotive Engineers held Sept. 2 and 3 at the Bellevue-Stratford Hotel, Philadelphia.

While the peculiar advantages of the water-cooled engine were not neglected in the discussions, a great many of the engineers appeared to hold the view that, when exhaustive tests have been completed and quantity production achieved, air cooled power plants will be in keen competition with water-cooled units even in those cases where power requirements are as high as 350-600 hp.

Above 600 hp., however, most of the technical men seemed inclined to think that water-cooled engines will remain supreme because of limitations in outside diameters of the air-cooled type. These general opinions were borne out to some extent by the statement of Commander E. E. Wilson, U. S. Navy, that the naval air service has plans which call for substitution of air-cooled in place of water-cooled engines in practically all naval planes up to 500 hp.

Other important problems discussed at the sessions included production of metal airplanes, design of planes for private ownership, development of airway lighting equipment, use of radio in flying, operation of airways, planes and airports, and progress in methods of mooring and handling rigid airships.

Aside from the prophesies made regarding the air-cooled airplane engine, perhaps the most significant development of the meeting were some of the statements of Lieut. Commander C. E. Rosendahl, commanding officer of the "Los Angeles," who condemned openly the present policies as regards lighter-than-air ships. He attributed the retarded progress of this country in rigid airships to five main factors: the location of the Naval Station at Lakehurst, because Lakehurst "lies in the path of every trans-continental storm"; lack of facilities for producing helium; lack of operating bases; reduction of funds available for development work, and poor handling of ground organization and operations.

A special event of the meeting was an inspection tour through the Naval Aircraft Factory in the Philadelphia Navy Yard where Service officers explained in detail many new planes, engines, equipment and methods of manufacture.

Land Catapult Demonstrated

In addition to being able to watch various phases of plane manufacture, particularly the construction of duralumin hulls for sea-craft which was one of the points discussed at length in the general session, the engineers witnessed exhibitions of launching a Vought seaplane from a land catapult. Practically all of the latest Army and Navy planes were assembled on the Navy Yard field for inspection, while in the sheds could be seen some of the new aircraft engines undergoing dynamometer tests. Among the latter were the Pratt & Whitney air-cooled "Wasp" radial engine and the Attendu two-cylinder oil-burning powerplant. During the visit, the three-engined Fokker planes, employed on the Philadelphia Rural Transit air-mail and passenger lines between the Navy Yard and Washington, arrived and departed exactly on schedule. Formation flights by the new Curtiss "Hawk" planes from Selfridge Field and practice bombing demonstrations by Martin planes were also included in the program.

Addresses made by the three newly appointed assistant secretaries for aviation and by Senator Hiram Bingham, sponsor of air legislation in Congress, gave those attend-

ing the Aeronautic Banquet on Thursday evening an opportunity to learn the governmental attitude toward both the administrative and legislative phases of aviation. An unusual number of well-known pilots attended both the dinner and the technical sessions.

Grover C. Leoning, president of the Leoning Aeronautical Corp. was toastmaster at the banquet. In the absence of Mayor Kendrick, of Philadelphia, Thomas W. Davis, city statistician, welcomed the convention to the city.

"If the promotion of aviation, as fostered by the recent Congress is to be a distinct success it will need the wholehearted support of the American public," U. S. Senator

Lieut. Com. C. E. Rosendahl of the airship Los Angeles was outspoken at the aeronautic meeting regarding the present policies which govern the development and handling of rigid airships

Hiram Bingham told the gathering. "The public must be taught to think in terms of the air just as our forefathers were taught to understand the action of the seas," the Senator continued. "They must be educated to air customs so that they can impress their Congressmen with the importance of aviation from the aspect of national defense."

If the five-year program laid down by Congress for aviation is to be completed the public must see that the money appropriated is actually spent on aviation, Senator Bingham said. The fact that Congress authorizes the spending of money does not complete the appropriation and it is for the public to see that the 1500 planes called for in the program are kept in the air. Senator Bingham criticized newspaper editors and reporters for not being conversant with "air terms."

Referring to the discussions of a year ago regarding a separate air service, Senator Bingham stated that at first he thought this was the right idea, but that later he reached the conclusion that planes are essential to the Army and Navy and to take these away from the two service branches would spoil the one issue at stake. "The Army and Navy need to be airified," Senator Bingham said, and added, "While aviation is expensive, it is indispensable to our national defense, and must be encouraged." Another point touched upon by the Senator was that of insurance. "Rates must be made proportionate to the risk of the trips," he said, "and little risk is entailed when the plane is sent over a regular airway with a good pilot, regular weather reports, proper lighting and plenty of emergency landing fields."

In praising contribution to aviation made by McCook Field, F. Trubee Davison, assistant secretary of war, stated that the technical research work now being done by the Army should be left to the industry and government agencies, specially equipped for such activity. He pictured McCook Field as the place for practical and experimental research. As an example of this latter type of investigation, Mr. Davison stressed the development of the service parachutes and the virtual elimination of the fire hazard in planes.

Edward P. Warner, assistant secretary of the navy, in a brief talk paid tribute to the manner in which the Society of Automotive Engineers has aided aviation development materially through the discussions which it has presented of aerodynamic theory, airplane and airship design and aircraft production methods. One of the chief functions performed by a technical society, however, Mr. Warner added, is that of providing a common meeting ground for those requiring the products of industry and those designing and manufacturing those products.

In the developing of aircraft there is urgent need for the closest cooperation between the designers, manufacturers and the actual operating personnel, Mr. Warner said, pointing out that the work of the designer may be cramped by a too detailed tabulation of specifications which must be complied with. In simplifying the preliminary operations, Mr. Warner believes the work of the S.A.E. has proved itself very valuable in making it possible for Army and Navy representatives to get together and exchange problems, experiences and ideas with the engineers and technicians of the aeronautic industry which has to supply these Service branches with aircraft equipment. With an increase in governmental appropriations for aviation from $100,000 15 years ago to $40,000,000 this year, Mr. Warner sees a proportionately increased need for cooperation between all factors in the industry.

Commercial Airlines

The three essential factors to be observed in the operation of commercial airlines, safety, low costs and comfort—were the basis of the speech by William P. MacCracken, Jr., assistant secretary of commerce. The most important problem ahead of us, he said, is the need for improvements in aircraft engine design, while considerable attention should be paid also to undercarriages, shock absorbers and cabins. In the last respect, Mr. MacCracken urges radical changes in the design of the commercial aircraft themselves, particularly with regards to the passenger cabins.

Cabin design, in his opinion, should be such that, in the event of a crash the passengers will be subjected to a minimum amount of danger. Additional air navigation features, need of regular air lanes, and plenty of emergency landing fields, he said, will do much to insure the safety of commercial airplanes.

To make air lines paying propositions, operation costs must be kept down to a minimum, even to the extent of small amounts like fuel, oil and operating repairs, Mr. MacCracken stated. To insure fairness and to see that successfully operated airlines are benefited, the government has not given exclusive franchises on any air routes, neither has it made any grants of land. The U. S. airlines are the only ones of their kind in the world, Mr. MacCracken said, which are actually capable of maintaining themselves financially, and this is due to keeping a close watch on operating costs. Up to this time the European airlines have not been capable of self-support and have been subsidised by their respective governments, he pointed out.

One feature often overlooked is that of passenger comfort. Mr. MacCracken urged this be given the deepest consideration by the airplane designers. "Passengers are willing to pay a premium for speed," he said, "but they will not pay a premium for discomfort." He urged that, in

addition to improving the design of the cabin, the matter of eliminating engine noise be considered carefully, especially in multi-engined planes. Satisfactory progress along these lines has been made by the Bureau of Standards, Mr. MacCracken said.

Two entirely different views on the relative importance of original cost and operating performance were expressed in two papers presented in the general session. In an abstract of Dr. Adole Rohrback's treatise on the production of Rohrback all-metal planes in Germany, it was stated that there would be a larger market for airplanes if the cost could be decreased by 10 per cent than if the performance were bettered by 10 per cent when a satisfactory design is reached. L. G. Meister who presented what may be considered a suggested ideal specification for privately operated planes, stated that economy in price should not exceed the advantages of having excess power in planes of this type. A feature of this session was the discussion between several pilots as to whether or not the pilot of a plane should be placed inside of the cabin of a closed plane or located out in the open.

In the air transport session an important paper was that of W. L. Smith, air mail service pilot employed on the night route of the New York-Cleveland section. His account of his experiences of night flying enabled the meeting to grasp more readily the details of the other two papers forming the session which dealt with lighting equipment, airports, radio, and various forms of beacons.

Marked Strides in Air-Cooled Engines

All Navy plane powerplants ranging from 200 to 500 hp. to be air-cooled, Commander E. E. Wilson says. New Pratt & Whitney and Wright units described in detail at aircraft engine session.

By Athel F. Denham

AIR-COOLED aircraft engines occupied the whole picture in the aircraft engine session which opened the meeting. Each of the three papers presented and most of the discussion dealt with this type, showing a rather remarkable change in attitude from similar meetings five or six years ago.

The Navy is going ahead in the substitution of air cooling for water cooling in all its planes with powerplants ranging from 200 to 500 hp. This was brought out by Commander E. E. Wilson in his paper on "Air-Cooled Engines in Naval Aircraft." The Wright Aeronautical Corporation announced further development in the well-known "Whirlwind" series, placing the performance of this engine on a par if not higher than that of the water-cooled engines of similar power, according to E. T. Jones, chief engineer of that company. George J. Mead, vice-president of Pratt & Whitney Aircraft Corporation, showed how two types of large radial air-cooled engines have been successfully developed by that company since August, 1925. These three papers presented a picture of the present status of the air-cooled engine which shows at least that this type of powerplant is definitely here to stay.

In outlining the Navy's policy of adopting air-cooled engines for all of its planes, Commander E. E. Wilson emphasized the fact that, due to the decrease in weight obtainable by the elimination of the cooling system, planes could be lightened structurally while still carrying the same useful load, which in turn permitted the use of lower powered engines, thus obtaining with a 500 hp. air-cooled engine the same performance as with a 725 hp. water-cooled power plant. Commander Wilson also emphasized the necessity of departing from the policy of building Navy planes solely for long life and durability. He urged that we strike a medium which will provide high performance in order that, in case of war, our planes should not be shot out of the air by enemy craft with higher performance but shorter life and lower safety factors.

It was also pointed out in this paper that the supposed larger head resistance, due to the larger frontal area of the air-cooled engine, is largely offset by the drag of the radiator and the heavier structure and powerplant of the water-cooled type. Actual installation of an air-cooled engine in ships designed for water-cooled types shows a performance which compares not unfavorably with the original installation, while the designing of a plane specifically for air-cooled engines provides a performance which is actually superior to that of similar water-cooled powerplant airplanes.

Mr. Jones, in his paper on "Progress in the Development of Air-Cooled Engines," gave the various stages by which the Wright J-type 200 hp. air-cooled radial was gradually improved through seven successive stages until its performance characteristics were at least on a par with the best water-cooled engines available and superior in many respects. The latest model in this line, the J-5, weighs two and a half pounds per horsepower, will develop 295 hp. at 2150 r.p.m. at sea-level with a

Commander E. E. Wilson, in his paper on air-cooled engines, revealed that the Navy plans to equip all planes requiring from 200 to 500 hp. with engines of this type

supercharger at a fuel consumption of .45 lbs. per hp. per hr., and has a life between overhauls of about 300 hours.

"The Story of the Wasp and the Hornet," presented by George J. Mead, described in detail how the Wasp, the second of the radial air-cooled engines on which the Navy is standardizing, was developed, designed, built, and on test in less than five months. The "Hornet" is identical in design to the "Wasp" but has a 25 per cent larger displacement, and develops in the neighborhood of 500 hp. as against 420 hp. for the "Wasp." The detailed design of this engine is described elsewhere in this issue, and involves such features as a solid master connecting rod, a split crankshaft and crankcase split in the center plane of the cylinders, front and rear halves being identical in design.

Mr. Jones, in his paper on the Wright J-5 engine, had made a statement that this engine had been subjected to a final 50-hour test under the severest conditions obtainable in respect to cylinder cooling. These conditions, they decided, were obtained not by running the engine at a higher speed and thus developing more horsepower, but running it at somewhat slower speed than the previous 50-hour test, thereby developing more brake mean effective pressure. This brought about an interesting discussion regarding cooling properties. Arthur Nutt, of the Curtiss Aeroplane and Motor Company, presiding at the session, questioned whether more severe conditions were really obtained in this way and whether cylinder cooling was not rather a function of b.m.e.p. than horsepower. Mr. Jones replied that he was not prepared to argue the matter, but that they had found by experience that the higher b.m.e.p. was really a more severe test, especially as it brought the question of detonation in, an important factor to be considered in air-cooled engine design.

Brewer Discusses Costs

W. A. Brewer, of Pitcairn Aviation, Inc., then took up the question of cost, stating that no consideration was given this factor in the various papers, although it was of paramount importance when considering the development of air-cooled engines for commercial use. In giving a brief analysis of the various factors involved in designing a commercial air-cooled engine from a strictly cost standpoint, Mr. Brewer pointed out that the limiting factor is the cost of the various accessories, such as magnetos, carburetor, etc., which have to be purchased by the manufacturer.

C. M. Manly was then called upon to give a few words in connection with engine development, Commander Wilson stating that Mr. Manly, some twenty years ago, had designed an air-cooled radial along lines which modern developments are following. Mr. Manly replied to the previous question of Mr. Brewer, saying that there is no need to worry at the present time about bringing down the cost of aircraft engines, at least until the desired performance and reliability is obtained. After that when the engine can be produced on a quantitative basis, cost will pretty much take care of itself.

Taking up also the question of cost, Harold Caminez, designer of the Fairchild Caminez aircraft engine, described in *Automotive Industries* of May 27, 1926, pointed out that his company is attacking the question of cost, not by cheapening of individual component parts but by simplification of design.

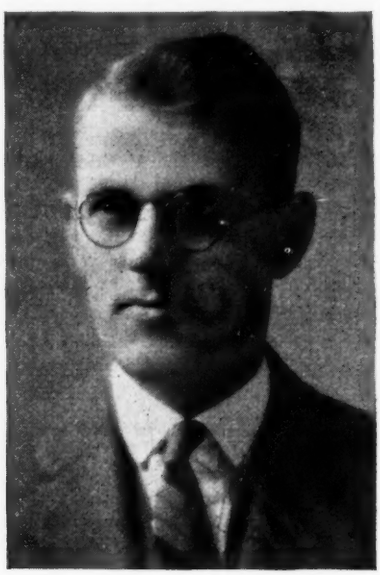
Replying to Mr. Brewer regarding initial costs of power plants, Commander Wilson stated that durability and performance should not be sacrificed to cost. On the other hand, increased production following standardization and elimination and modification of certain requirements for training engines should lead to a material reduction in initial cost.

Crankshaft Speeds

A question regarding a statement in Commander Wilson's paper was then raised by Mr. Nutt. Commander Wilson had stated that engines in pursuit planes now turned normally at 2250 r.p.m., and in a dive reached crankshaft speeds as high as 3000 to 3500 r.p.m. Mr. Nutt asked whether such high crankshaft speeds could be obtained with the air-cooled engines which the Navy was adopting. Mr. Mead replied to this by saying that with the air-cooled installations and a dive of equal speed to the water-cooled powerplant type of airplane, it has been found that crankshaft speeds do not go much over 2400 r.p.m. He pointed out that speed in a dive is not so much a function of crankshaft speed as it is of weight. Charles L. Lawrance, president of the Wright Aeronau-

E. T. Jones, who told of the development of the new Wright "Whirlwind" J-5 aircraft engine

The story of the "Wasp" and the "Hornet" was related by G. J. Mead of Pratt & Whitney Aircraft Co.



Arthur Nutt, of the Curtiss Aeroplane & Motor Co., presided as chairman of the Engine Session

tical Corporation, added to this the opinion there is no reason why air-cooled engines cannot be built to turn up just as fast as water-cooled types. The limiting factor in this case is the bearing load, which, in a radial engine, travels around the crankpin bearing, thus being distributed, whereas in a water-cooled type such is not the case. Providing proper cooling is furnished for the bearing, there should be no reason why such high speeds cannot be obtained with the radial air-cooled type.

C. F. Taylor, of the Aeronautical Engineering Department of Massachusetts Institute of Technology, was of the opinion, however, that if the water-cooled type of engine is to compete with the air-cooled radial, it will have to do so on the basis of crankshaft speed. Cooling problems increase with the higher horsepower per cubic inch developed at higher speed, cooling being a function of horsepower developed per unit area of heat dissipating surface. Moreover, he pointed out, racing automobile engines now developed about 100 hp. from about 91 cubic inches of piston displacement. Mr. Taylor wanted to know whether this could be done with air-cooled engines.

Replying to Mr. Taylor, Commander Wilson stated that the problem of cooling at overspeeds is identical in water-cooled and air-cooled engines, as it depends not on radiator capacity but on cylinder cooling capacity.

Temperature and Fuel

Replying to a question regarding the effect of outside air temperature on fuel consumption in air-cooled radials, Mr. Jones stated that in the experience of his company, fuel consumption is independent of outside air temperature conditions except where richening is required to avoid detonation.

William B. Stout emphasized the point in Commander Wilson's paper that frontal area is not as important in radial engine design as it would seem in a comparison with water-cooled types, pointing out that the installation of gear reductions in the nose and the use of larger propellers permitted airplane designers to cowl in the center part of the engine, using a fairly large spinner on the propeller without losing any appreciable thrust, thereby increasing the efficiency of the stream-lining of the fuselage. He stated that in the experience of the Ford airlines about 60 per cent of the forced landings were due to troubles in the water system, this being one of the main reasons for the adoption of air-cooled engines in Ford planes.

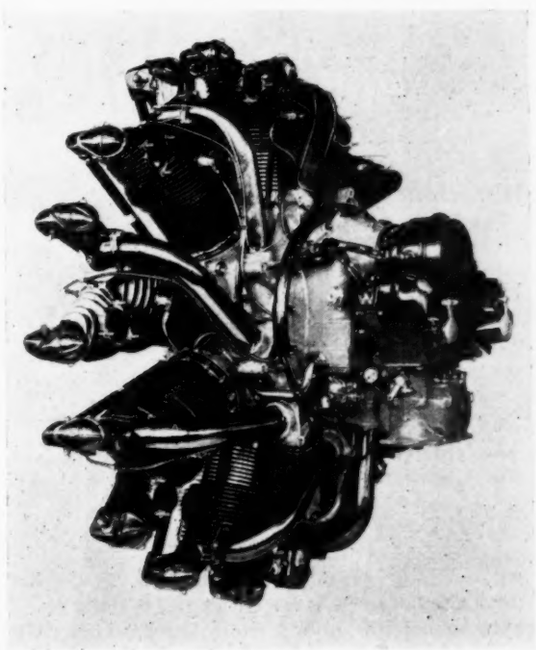
An additional statement, made by Commander Wilson in closing the discussion, was that with the new types of cylinder heads now used by Pratt & Whitney and the Wright Aeronautical Corporation, supercharging at sea levels—and thereby obtaining much higher powers at this altitude—is possible with air-cooled engines, while water-cooled engines have not been effectively supercharged at this level.

Air-Cooled Engines in Naval Aircraft

FOLLOWING is an abstract of the paper presented by Commander E. E. Wilson on "Air-Cooled Engines in Naval Aircraft": In the development of naval aircraft the weight per horsepower of the aircraft engine is manifestly of the greatest importance, not only because of itself but also because this weight is reflected back into the weight of the plane structure. A brief comparison of power plant weights between water-cooled and air-cooled engines shows that the water-cooled type is heavier than the air-cooled by roughly 0.6 lb. per hp. An analysis of engine failures indicates that a high percentage of the trouble is due to faults of the plumbing system, and the elimination of one of these pipe lines therefore results in the elimination of about one-third of the troubles.

For training airplanes a 200 hp. engine is required and it is met by the Wright "Whirlwind," nine cylinder static radial engine. In the fighter and observation class the 200 hp. engine has been used pending the development of the larger engine, which is now available in the Pratt and Whitney "Wasp." This engine is now challenging the supremacy of the water-cooled engine in this field.

Water-cooled engine proponents point to the large frontal area of the air-cooled engine as a bar to its use in fighters. When an air-cooled engine is installed in an airplane, however, it is found that it can be cowled so that the cylinder-heads only are presented as drag-areas.



The Pratt & Whitney "Wasp" which the Navy is adopting for all planes requiring powerplants of from 200 to 500 hp. A description appears on page ***418 of this issue,***

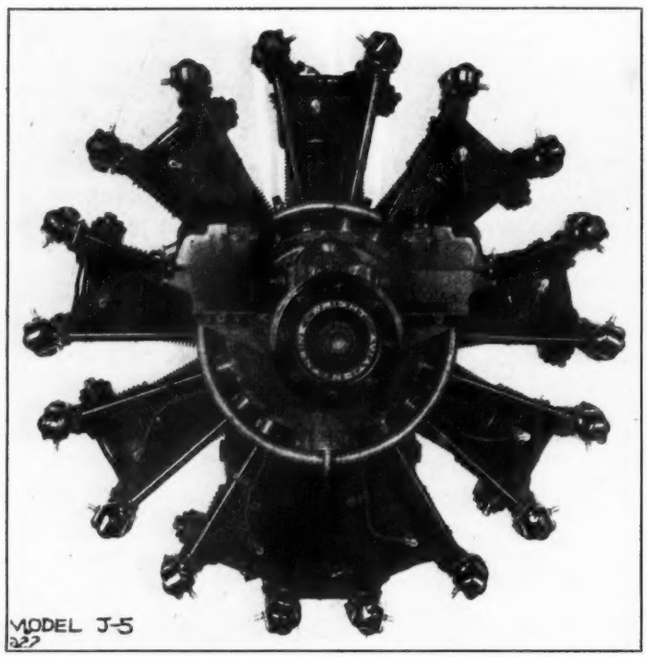
In a water-cooled engine installation it is required that the drag-area of the radiator be taken into consideration. Moreover, the drag resulting from the additional wing area required to support the cooling system must be considered. Although means of stream-lining air-cooled cylinder heads have not been developed, the air-cooled engine compares not unfavorably with the water-cooled engine when all factors are taken into consideration.

The Wright "Apache" airplane, a single seat fighter, equipped with the Pratt & Whitney "Wasp," as an example to show what can be expected of an air-cooled engine installed in an airplane especially designed to accommodate it, shows speeds at least equal to those of the water-cooled fighters and a climb and a ceiling which are definitely superior. With air-cooled engines it has been found that super-charging to sea-level conditions at 28,000 feet require no alterations or accessories.

In the bombing and torpedoing airplane classes, the latest machines are equipped with engines of 725 hp. The weight of the cooling system is approximately 500 lbs. A re-designed airplane carrying the same useful load has the same range with a 500 hp. air-cooled engine, and

through simplification of the installation and the reduction of weight of the structure an even better performance can be had with the 500 hp. air-cooled than with the 725 hp. water-cooled engine.

It seems that the time has come when there must be established some intermediate ground between the design of an airplane for high performance in combat, with low factors of safety, and the design of aircraft which will have long life and ruggedness, resulting in an airplane of low performance, which has been the policy.



New Wright "Whirlwind" J-5 radial type airplane engine, showing enclosed valve mechanism and new location of spark plugs

Between the radial and in-line types of engines, the Navy prefers the radial engine up to at least 600 hp. The large air-cooled engines are now equipped with two to one reduction gears and can be installed thus geared or with direct drive in twin engine patrol planes, thus making the entire range of Naval aircraft air-cooled.

Dependability of air-cooled engines has been tremendously increased through improved design. An engine life of 300 hours between overhauls has been achieved, an improvement of 400 per cent over the Liberty.

Development of Wright J-5 Aircraft Engine

E. T. JONES, chief engineer of the Wright Aeronautical Corporation, in his paper, "Development of the Wright 'Whirlwind' Type J-5 Aircraft Engine," dealt with the various factors involved leading to the present development of the Wright Whirlwind series, the J-5. These developments were discussed in *Automotive Industries* of September 2, up to and including the production of the J-4B.

The J-5 model, which succeeds the J-4B, was brought out to improve the fuel consumption and put it on a par with the better engines in the water-cooled class. Following is an abstract of the remainder of the paper:

It was decided in bringing out the J-5 to abandon the Lawrence type of cylinder in favor of the type developed by Mr. Heron. The cylinder is characterized by a hemispherical combustion chamber employing two valves with axes inclined at 70 degrees. The cylinder barrel with integral cooling fins and hold-down flange is screwed and shrunk into the aluminum headcasting. Among the advantages of this cylinder over the Lawrence type is the superior head cooling due to the larger fin area provided by the hemispherical chamber and the larger space between the valve ports; superior barrel cooling by avoiding the necessity of conducting the heat across a thermal gap between the aluminum barrel and the steel liner; better fuel economy presumably due to the combustion chamber shape and improved valve cooling; freedom from detonation and greater strength and ability to stand abuse.

Cylinder Head Casting Simple

The cylinder head casting is extremely simple, there being no loose pieces on the pattern and the core being confined to a single piece. The apparent cost of producing the barrel with integral steel fins is more than offset by the fact that the grinding of the outside of the steel liner and the inside of the aluminum barrel as used in the former types, is entirely eliminated.

The average fuel consumption of the first fifteen engines produced was .46 lb. per hp. per hour using straight gasoline and a compression ratio of 5.44. The first fifty-hour test of the J-5 was run at full throttle, developing 238 hp. at 1971 r.p.m. with a fuel consumption of .508 lb. per hp. per hour, and an oil consumption of .017 lb. per hp. per hour. A second fifty-hour test was run using a lower fuel consumption, the average for the fifty hours being .458 lb. per hp. per hour, the power developed being 216 hp. at 1827 r.p.m. To submit the engine to an even more severe test it was decided to run it with an externally built supercharger at 2150 r.p.m., at which speed it developed 295 hp., corresponding to a brake mean effective pressure of 138 lbs. per square inch. Straight gasoline was used, and no detonation occurred although the temperature of the air leaving the supercharger was 140 degrees Fahr. During this test several valve collars failed, heavier valve collars not eliminating this trouble. The cam was then modified so as to reduce the maximum acceleration without decreasing the lift. Throughout the balance of the test no further failures of valve collars occurred.

Grover Loening, of the Loening Aeronautical Engineering Corp., filled a responsible role in the program as toastmaster of the Aeronautic Banquet on Thursday evening

Interest Shown in Metal Construction

General Session devoted largely to discussion of metal plane production and construction details. Methods used in landing dirigibles discussed. Government inspection of airplanes urged.

By Leslie S. Gillette

VIRTUALLY every phase of aviation development was touched upon in the three papers and the discussions forming the General Session. Metal airplane production and construction details was the main topic. Specifications for privately owned planes, especially with regards to whether or not the pilot should be enclosed with the passengers in the cabin, caused a debate between several well-known commercial pilots. The value of government inspection of planes and pilots was a point of intense discussion, while the relative merits of different types of rigid airship mooring was another important topic. The three papers differed greatly in scope and covered the handling of dirigibles, planes for individual ownership, and the construction of all-metal planes in Germany.

Lieutenant Commander C. E. Rosendahl, officer in charge of the U. S. Airship "Los Angeles," and formerly second in command of the ill-fated "Shenandoah," in his paper entitled "Development of Methods for Mooring and Handling Airships," assailed the present status of rigid airship development in this country. He said that the Lakehurst Naval Air Station was in one of the worst locations meteorologically for airship operation and that the country's main dirigible base lies "in the path of every trans-continental storm." Airship development was further retarded, Rosendahl said, through lack of lighter-than-air rigid craft for experimental and test work, (the "Los Angeles" being the only rigid airship in the country), lack of helium gas, few operating bases, lack of important airship missions and, finally, poor ground-handling methods. Methods which are now under development at Lakehurst for the mechanical handling of dirigibles and which are expected to reduce the ground crew from 250 men to less than 100 men, were described.

Upson Favors Mooring Mast

Ralph Upson of the Aircraft Development Corp. and designer of the "metal-clad" rigid airship now under construction at Detroit, supplemented Rosendahl's remarks regarding the need for adequate mooring facilities but said he believed there were advantages in having the airship depart from its base via the mooring mast.

The naval commander's plans for the airship being hauled to the ground and held there when making contact with its base. "This arrangement," Rosendahl said, "enabled the airship to get away easier than when moored to the top of the mast, as it is possible to impart a greater buoyancy effect to the ship while on the ground than when held to the mast.

"Violent movements of the tail of the airship when it is moored to the mast in windy weather and the necessity for a large crew to be aboard to control the ship while at the mast, are eliminated by the ground mooring idea," Rosendahl said. Upson responded that with proper aerodynamic design of the envelope and proper location of the pressures, in addition to the use of a better mooring mast, such as the one remaining unused at Detroit, the present difficulties of mast mooring will disappear. Upson gave the following as the three essentials of a successful airship: (1) It must be able to fly in any kind of weather; (2) be safe when using any kind of gas or fuel; (3) able to be moored in the open for long periods. In connection with the third item, Upson said that a metal covering is the solution as the present fabric covers for the envelopes will not stand up in the open and they also affect the lifting qualities of the ship.

W. B. Stout, of the Stout Metal Airplane Co., was enthusiastic about Dr. Adole Rohrbach's paper on the economical and rapid production of all-metal aircraft

Among the ideal specifications for a private operator's airplane, L. G. Meister of the Buhl-Verville Aircraft Co., Detroit, and also one of the winning pilots in the Ford Airplane Tour, in his paper on "Airplanes for Individual Ownership," stated it is very important that the plane for the private owner should have excess of power rather than economy in price. Figures presented by Meister show that in the case of two Verville "Airster" planes of exactly the same design except for power plants, it is more economical to operate the plane with the modern 200 hp. engine than it was to fly the other plane with the older 90 hp. power plant. Besides the saving in fuel, the larger engine allows the plane to make a faster climb, takes-off quicker, gives better control and simplifies engine maintenance. Some of the essential factors which the modern plane should embody were given by Meister as follows: Wheel brakes, a caster mounted rear wheel in place of a tail skid (used in conjunction with main wheel brakes), axleless undercarriage with rubber disk type shock absorbers, folding wings, detachable engine mounting, numerous inspection openings, crash-proof fuel tanks,

easy entrance to cabin or cockpit, efficient muffling, metal propellor, single engined plane should employ an engine having a maximum horsepower of 250 and also should be air-cooled, either of the radial or "vee" type.

Where to Place the Pilot

In the discussion following the paper lively arguments ensued between several well-known commercial pilots present concerning the relative merits of placing the pilot inside of an enclosed cabin or out in the open. No definite conclusions were arrived at but the concensus of opinion indicated that future design probably will provide for the pilot being enclosed, although separated from the passenger cabin. The design will be such that it will be possible for the pilot to open his compartment all round and thereby gain the open cockpit effect for rough weather. Richard H. Depew, pilot of the Fairchild enclosed cabin monoplane, stated that older pilots like himself, in the beginning were adverse to flying in a closed cabin but it will be only a matter of time before every pilot will want an enclosed cabin. In citing his experiences in the Ford Reliability Tour when wet and foggy weather was encountered several times, Depew said "that on very few occasions did the nature of the atmosphere render visibility poor from the cabin and then it was only necessary to use the goggles and open one of the side windows and peer out." "With proper design," Depew said "it should be possible to construct a cabin so that rain and moisture should not interfere with visibility."

Walter H. Barling, designer of the world's largest bombing plane, in commenting on Meister's paper, stated that he thought government inspection of pilots and planes would hinder and bar many planes and pilots now flying. In replying, Meister stated that those machines and men which couldn't pass the tests were not an asset to commercial aviation and gave two examples from the Ford Airplane Tour. At two of the largest cities where the planes stopped on the tour, rickety war-time machines came out to greet the contest planes. In every case the modern planes with their reliable pilots participating in the tour effected graceful landings while at least two of the war-time ships were wrecked in landing and others damaged. To those of the public who have not been educated to see the difference between the modern planes and the old "flying crates" the Reliability Tour did not mean anything and the newspapers in referring to the crashes gave the impression these planes were connected with the tour. In these cities aviation received a set-back instead of a boost, and with proper inspection the planes would not have been allowed to fly and it is doubtful if the pilots would either, Meister said.

List of Questions Prepared

Such interest was shown in the reading of Dr. Adole Rohrbach's paper entitled "Economical and Rapid Production of All-Metal Airplanes and Seaplanes," presented by Charles H. Keel, that Alexander Klemin, of N. Y. University, chairman of the session, prepared a list of questions asked by the members, which will be sent to Dr. Rohrbach in Germany. Some of the things the members wanted to know was the cost of producing the Rohrbach planes and how the cost compares with other metal planes and also with the wooden types, the thickness of the metal wing skin, additional data on how the side floats assist in the "take-off," and methods used to prevent corrosion. The last mentioned was the point of most interest and several members arose to express their views on the subject.

In developing the Rohrbach planes, Germany has made another valuable contribution to the manufacture of all-metal machines, William B. Stout, of the airplane division of the Ford Motor Co., said. Continuing, he emphasized the need of cutting plane production costs at this time and said that further reductions will come with quantity and standardized production. Using his well-known remark, "A commercial airplane is one which must support itself in the air at all times—financially"—Stout pointed out that in present aviation development the big problems ahead of the designers is more of a business proposition rather than an engineering problem and that in order to pay dividends planes must be able to double their pay loads per dollar and double the number of hours per day they are in the air. In solving this problem thoughts must be concentrated on the development of more dependable and cheaper airplane engines.

Two pilots, Harold F. Pitcairn and Mr. Depew, both inquired regarding the use of duralumin and the effects of the atmosphere, specially sea air and water, on the metal. Pitcairn asked also if experiments have been made to show what chemical action takes place after duralumin has been exposed to the weather for periods of greater than two years. One operator of a flying boat having a duralumin hull stated he had combated successfully the effects of corrosion by coating the entire hull with a special grease. He was waiting, he said, for a special varnish or other compound which could be used more effectively.

Riveting Thin Sheets

Answering a question relative to the thinnest gauge at which metal sheets can be riveted satisfactorily, Ralph Upson stated that in experimental work connected with the "metal-clad" airship they have found it possible to rivet metal sheet less than .008 in. thick. To accomplish this, special equipment had to be manufactured, including special rivets and riveting machines, automatic feeders and jigs. With a new machine just developed aluminum alloy wire of .040 in. thickness is automatically cut into lengths and fed into the riveting machine which secures two sheets of .008 in. thickness together by placing 12 rivets to an inch in the seam. These twelve rivets are arranged in three rows and set in a staggered fashion.

Abstracts of the three papers given in the General Session follow:

Dr. Rohrbach Tells How He Builds Metal Planes

CHARLES H. KEEL presented the paper which had been pepared by Dr. Adole Rohrbach, of the Rohrbach Metall-Flugzeubau, Germany, on "The Economical and Rapid Production of All-Metal Airplanes and Seaplanes." Dr. Rohrbach said in part:

In the present period of airplane development it is more important to reduce the time and cost of production than to concentrate too much on further perfection of constructional details with regard to performance. We possess already sufficient knowledge, structural as well as aerodynamical, so that we are able to construct very efficient airplanes of any size and for every purpose. The methods of stress calculation and performance computation are in most cases more accurate than the basic conditions of such calculations.

The general use of the airplane and consequently the chance to sell more of them, will be greatly increased by a reduction of price of 10 per cent, rather than by an improvement of performance of the same amount. Though this principle could be applied to the airplane

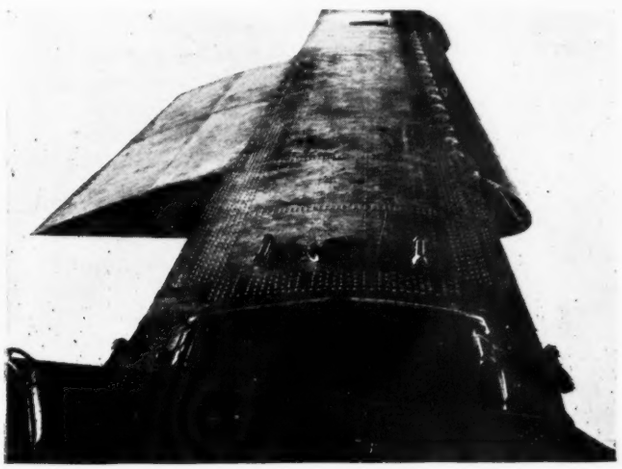
This view of the Rohrbach all-metal flying boat shows the location of the pontoons on either side of the hull. These side pontoons, in addition to increasing the stability of the plane while on the water, also materially assist in the "take-off"

industry of any country, it is perhaps most important with us in Germany, because we have no military aviation. Therefore our airplanes constructors are forced to sell as many machines as possible on foreign markets. For many of these foreign customers it is rather difficult

The unusual engine arrangement employed on the Rohrbach all-metal flying boats can be seen in this view. The position of the side floats in the water should also be noted

to compare the performance of different machines, but most easy to compare their prices.

Since there is up to now no market for any uniform type of machine, we must be able to construct as many types as possible for every requirement and with any



This view of a complete wing shows the manner in which the front and rear sections of the wing are applied to the main structure. The structure is metal throughout

desired engine in the shortest possible time. Naturally the production could be much cheaper still if greater serials of the same type could be manufactured, as may be possible with the different conditions of your country in the near future.

By the following methods we endeavor to reduce the time and cost of building new types. The most important factor is to adhere to a number of technical principles in order to reduce to a minimum the risk of new types. These technical principles refer to the general arrangement and lay-out, as well as to the detail-design of many parts of the machines.

The other chief efforts to reduce the risk, time and cost of new types is a very careful and minute preparation of the actual work-shop construction by means of most perfect work-shop drawings, and the whole organization of the technical departments.

We endeavor to use the highest possible wing loading and to secure the power loading correspondingly. As is generally known, wing loading means smaller bending— and twisting movements of the wing, a shorter tail and smaller tailplanes, and consequently smaller deadweight, greater robustness of the whole structure and smaller building cost. The disadvantages of small wings are reduced climb and higher take-off speed. To a certain extent both these disadvantages may be counterbalanced by a smaller power loading. Another drawback of too high a wing loading is a relatively bad L/D ratio of the whole machine.

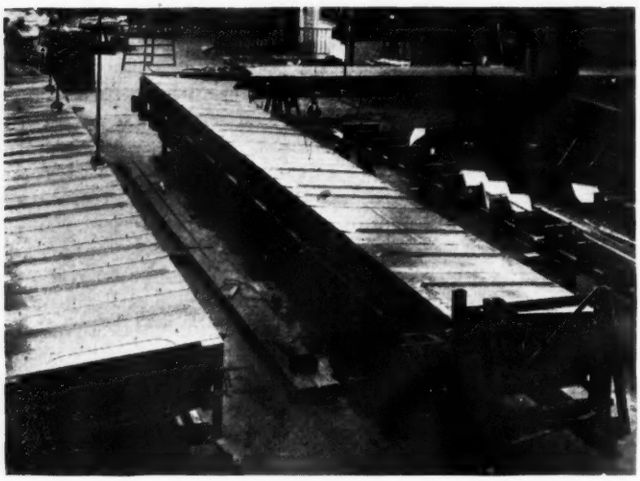
Monoplanes Only

We build no more biplanes, but monoplanes only for all purposes. The art of constructing biplanes is relatively much more developed than the monoplane. Nevertheless, we obtain already today with the monoplane at least the same performance, and often a much better one, than with the biplane. Apart from that the monoplane is more simple and robust, and therefore cheaper in every respect. It has been argued that monoplanes must be less maneuverable than biplanes on account of their greater span. It is true that the moment of inertia of the machine is increased by the greater span. But the monoplane tail is also longer, so that the lever arms of all control surfaces are correspondingly increased. Apart from that, we have found that the amount of dihedral angle has much more influence on the lateral controllability than the moment of inertia.

Before the construction of our first flying boat, we made a very extensive investigation regarding the merits of different flotation systems, i.e., of the twin float arrangement, of the flying boat with small auxiliary floats underneath the wing tips, of the flying boat with sponsons like the Dornier Wal, and of our system, with rather big stabilizing floats situated relatively near the main hull. We found the last system by far the most promising with regard to floating stability, and to weight and air resistance as well. By means of many tank tests, we succeeded in finding such a shape and position of the floats that they give so much lift during the first half of the take-off period as to permit of a considerable reduction of the dimensions of the hull with a corresponding saving in weight and air resistance.

The advantages and drawbacks of the different floatation systems becomes the more pronounced the bigger the size of the machines. Serious doubts have been expressed whether the stabilizing floats of our machine would not break away in a rough sea. Up to now this has never happened, not even a strut has been hurt. This is due partly to the very high factor of safety of the float struts and partly to the rather high position of the stabilizing floats relative to the bottom of the boat, which

protects the floats from the heaviest shocks. At high speeds the boat alone gives all the water lift. In order to protect the machine from capsizing in the event of damage to the side floats there are water tight bulkheads in the side pontoons, and water tight compartments in the wing tips. The water tight bulkheads of the side float proved useful in several cases when the riveting was not quite water tight or the people had forgotten to close the water drain screws.



This view shows the main structures of the wings in the jigs. Standard size tubing and metal sheets, which can be bought in the open market, make it possible to reduce manufacturing costs

We prefer the arrangement of two engines side by side on account of the better maneuverability on the water at slow speeds. With the central tandem as used on the Dornier Wal and some other types, many engine revolutions with corresponding high taxi-ing speed are necessary in order to obtain maneuverability by means of the slip stream. The better maneuverability resulting from the side by side propellers is most useful in heavy seas and in narrow waters. The central tandem propeller has the advantage that the maneuverability does not become worse if one engine stops. With the side by side propeller one can taxi a straight course by means of rudder and aileron, if there is enough wind, and if the course is not too much out of the wind. A water rudder would also be necessary in order to taxi more than 60 degrees out of strong wind with central tandem propellers, so that the desirability of the water rudder is the same for any engine arrangement and no special disadvantage of the side by side propellers.

If one engine fails in the air it is easier to follow a straight course with the central tandem, but if the engines are placed high above the wing, as in the case of our flying boats, they can be near together that the turning moment of one-sided propeller thrust can be easily counterbalanced either by rudder setting of about 6-12 degrees or by setting the whole tail plane unit about as much. The other arguments, as for instance, air resistance, weight and propeller efficiency, which are frequently used, both pro and contra tandem, or side by side propeller balance each other so that neither of the two systems is distinctly in advantage to the other.

The two main problems entering into metal covered wings are:

1. Light weight as a compromise with great strength and robustness.
2. Easy maintenance and repairability of the whole structure.

Though the stressed skin construction out of a flat plate is in principle most suited to obtain a high and rigid metal covered wing, a very great amount of detail work was required before this type of wing construction could be really mastered. Since 1919 a great number of tests were made to find out the best form and arrangement of every detail member of these hollow box girders. Through extensive tests we have gained such knowledge that today the strength and deformation of such girders can be calculated with an accuracy of 5 and 10 per cent respectively. As we succeeded in getting a lighter and lighter girder of the same strength, the deformation becomes more and more important. In order to reduce the torsional wing deformation during the nose dive, a wing profile with exceptionally small turning moment of the resultant air force at zero lift was developed by means of aerodynamical calculations and wind-tunnel tests. In order to reduce the deformation through bending moments, we have adopted a very tapered wing.

The hulls of our first types, Ro II, Ro III, Ro IIIa, have a flat bottom from the first step forward. The bottom from the first to the second step is slightly keeled. The mutual position and shape of the two boat steps and of the stability floats had been developed by means of numerous tank tests. The flat bottom had been adopted because it had been normal German practice with nearly all twin float machines and the few flying boats which we had at the end of the war. From the experience of that time the flat bottom seemed to be the only shape which permitted a short take-off. Type Ro III is our first boat with keeled bottom. The boat seems to have a somewhat longer take-off on calm water and no wind than the flat type Ro III, which took off with two Lorraine-Dietrich engines and full contract load in 14 sec. In order to obtain a short take-off with this type of keeled boat, the pilot has to know its minimum flying speed, and to draw the machine clear of the water as soon as he knows from the speed indicator that he has reached this speed. The flat bottom boat Ro III takes off by itself without the pilot's assistance. In heavy seas, however, the take-off of the keeled type Ro VII is much smoother and faster. The local stresses on the keeled bottom must be very small, since no bulkhead was ever broken in spite of a very great strength reduction in the design of these bulkheads with regard to local stresses, as compared with Ro III. Another new and very important feature of Ro

Characteristics of Latest Rohrbach Types

Designation	Ro IIIa	Ro VII	Ro VIII	Ro IX	Ro V
Type	Flying-Boat	Flying-Boat	Landplane Bomber	Single-seater Fighter	Flying-Boat
Engines	2 Lorraine Deitrich each 450-hp	2 BMW 4 each 230 hp	3 BMW 4 each 230 hp	1 BMW 6 460 hp	2 Rolls-Royce Condor III each 650 hp
Maximum Weight in kg	5800	3300	5700	1950	9000
Load per sq/m in kg/m2	79	82.5	65	69.6	95.7
L/D	10.7	10.0	12.9	11.0	10.4
Factor of Safety "A Fall"	5	4.7	4.6	14.3	5
Weight of Flying-Structure per cent	39.7	30.9	30.6	32.3	34.4
Weight of Power Plant per cent	26.0	29.4	26.6	37.0	22.7
Load per cent	34.3	39.7	42.8	30.7	42.9

VII, as compared with Ro III, is the very high bow and high deck of the forepart, to obtain greater safety from waves splashing on the deck.

One of the most important problems is that of corrosion. We had great trouble in this respect, but this seems to be definitely overcome with all the precautions which we use now. It is perhaps of interest to give some details regarding corrosion. All profiles and connecting points must be accessible from both sides, so that they can be easily inspected and repainted. All plates, butt straps and profiles are painted before being riveted together. The rivets are of the same alloy as the plates and profiles, and are annealed at 510 deg. Celsius. Rivets that are annealed at a smaller temperature are much easier corroded. A sort of black varnish has proved the best protective against corrosion. Great care is necessary when other metals are connected with duraiumin. Bronze and copper are most dangerous because their electrical tension is very high and destroys duraiumin rapidly. The same occurs with many kinds of chrome steel and also with stainless steel which contains much nickel. We endeavor to use steel with not too high electrical tension against duralumin and we isolate all steel fittings by thick protective painting between the steel and duralumin.

Piece-Work System

In order to reduce the time and cost of construction and to need as little material as possible, we endeavor to prepare all drawing part lists and construction orders so that the workman has not to think about the work, but only to execute this work as rapidly and as well as he can. We do not pay by the time, but by the piece only. The part lists are the basis of the orders given to the workshop, and the part lists are arranged to comply as completely as possible with the actual construction. That means that all fittings and bearings of the control system and the power plant installation, which are fixed to parts of the wing, are mentioned on these wing part lists, so that they can be fitted during the construction with great reduction of the assembling time. Every small part and every rivet is fixed on some drawing. The drawings are so subdivided that only very few things are represented on one drawing in order to facilitate alterations. It is for the same reason that, as far as possible, the dimensions are given on one drawing only. About 1800 drawings and 700 part lists are necessary for a flying boat like Ro III.

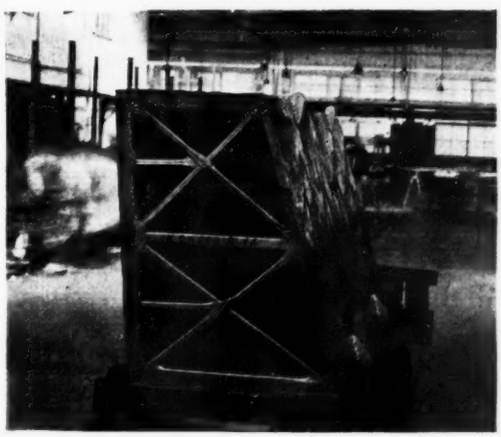
In order to avoid all unnecessary delay in the execution of workshop drawings, we make a very complete initial design before making any workshop drawings at all. All aerodynamical and strength calculations are made by special departments of the design bureau, so that the draftsman has very little to do with such questions, but he obtains the thickness of every plate, all profiles dimensions, the profile arrangement of every girder, the number and size of rivets for every important point, as well as the shape of every part which is exposed to the air, from the initial design department. This careful preparation minimizes the necessity of alterations and results in such a set of drawings and part lists that a series of 20 machines could be constructed by them as well.

Making the wing in sections enables easy inspection for maintenance and also reduces the cost of manufacture. This view shows a section of the leading edge raised for inspection

The general style of all drawings is quite uniform in order to lose less time in the shop before they are understood.

We have made in our office in Berlin drawings for our shops in Berlin and Copenhagen, as well as for our licensees in Japan and England. The work in Copenhagen, Japan and Glasgow is carried out without any personal contact, exclusively on the basis of our drawings and part lists.

The construction of metal airplanes requires a great number of special tools and jigs. In order to reduce the number of special tools we have standardized on duraiumin profiles, riveting spaces, bolts, etc. There is no industry where the cheapness of jigs is so important as in the aircraft industry, with its frequent design alterations and relatively small production. Cheap jigs have



Left—This view gives a good example of a typical portion of the wing structure. Right—By means of hinge joints and latches, the front and rear sections of a wing are attached to the main sections. This view shows a portion of the leading edge

the additional advantage that they are made in a short time, so that the building of a new type is not so much delayed by the waiting for jigs. It is a special advantage of our shipbuilding type of construction and of the principle to subdivide the wings into a number of parts that the jigs are most simple. For a number of operations we have made adjustable jigs which can be used for different types.

The wing consists, as already described, of the hollow box girder and nose and trailing end boxes to complete the wing profile. The webs of the box girder are cut out of plates. The right shape of the cutouts is obtained by following a plywood jig which is fixed on the plate. These cutout plates are then held in the right position with the girder angle profiles by means of jigs. On these jigs the angles are fixed to the girder plates by means of some rivets or screws. The girder is then taken out of the jig and all the rivets are made by means of riveting machines. The transverse walls are made in the same way as the longitudinal girders. The assembling of the finished longitudinal girders with the tranverse walls is done on a steel fundament.

The next process is the fixing of the lower skin. After that the girder is taken from its bed and the upper skin is riveted on. Most of the riveted seams between the separate plates of upper and lower skin are made by means of riveting machines. The assembling rivets which connect the skin with the girders and transverse walls are made with pneumatic hammers. The steel fittings of the joint between wing and boat are riveted into the box girder on a special jig, which secures their right position. All other steel fittings for the fixing of engine or landing gear struts, all bearings for the aileron control rods, and all bearings for nose and end boxes are also fixed to the box girders, so that it is entirely finished and no more work rests with this part.

The design of our flying boat Ro VII was started in the middle of February this year. The actual construction in the workshop began in the first days of April; the first two boats were ready to fly in the last days of June.

Mooring and Handling of Rigid Airships

THE development of rigid airships in the United States has been retarded by a combination of several factors, according to Lieut. Commander C. E. Rosendahl, who discussed "Development of Methods for Mooring and Handling Rigid Airships." Chief among these retarding factors, Commander Rosendahl said, is the location of the Naval Air Station, at Lakehurst, N. J., a place which is altogether unsuitable for airship operation due to the constant squalls, storms and adverse winds which sweep this region of the country. Lack of suitable bases, mooring masts and facilities for developing helium resources are other causes, while poor ground handling methods and the difficulty of taking airships in and out of their hangars are responsible for the postponement and abandonment of many flights.

Practically every flight attempted by the "Los Angeles" is for the purpose of testing new equipment just installed and many projected airship missions have been encumbered on account of this. Among the most essential details which should be attended to, Commander Rosendahl said, are improvement of the meteorological service and the more frequent issuance of weather bulletins.

One of the worst features in connection with the structure of present and past rigid airships, according to Commander Rosendahl, has been neglect of suitable provision in the original design of the dirigibles for adequate ground handling methods. In the case of handling an airship coming out of its hangar in a strong side wind the strain from some thirty or forty men pulling by ropes against some point of the structure causes a severe strain and the greatest caution has to be used. The "Los Angeles" is at the present time having the supporting struts of the rear center line cabin reinforced to take care of the strains in handling the ship and similar reinforcing has been necessary at several parts of the ship.

New methods are now being worked out to simplify handling airships on the ground. This new mooring device which virtually eliminates the hangar except when it is to be used for the same purpose as a dry dock is employed for a sea vessel, much will be accomplished to remove public prejudice against airships. Briefly, the arrangement consists of having the center line cars of the airship rest in trolleys after the ship has been drawn to the ground by winches, following the throwing out of the handling ropes by the ship crew. When resting on the ground the ship will be adequately secured and free to swing with the wind. Tractors provided with winches and running on steel tracks—the latter entering the hangar and extending outwards parallel with the sides of the shed—will be employed to draw the airship from its hangar and also to hold it against the wind while it is being taken in or out of its shed. The substitution of the mechanical means will make for simpler ground mooring. Less than 100 men will be necessary to handle the airship as compared with the 250 to 300 men now required.

Features Which Appeal to Individual Owners

FOLLOWING is a digest of L. G. Meister's paper on "Airplanes for Individual Ownership":

To accurately predict the requirements of those individuals who desire airplanes for their personal use is more than an individual problem. These requirements are governed by individual desires and geographical locations. Our information has been gained from the inquiries we have received throughout the country specifying varying requirements and these usually can be met without altering our basic designs.

For the smaller types the present training plane factors should suffice, and for the larger types the present transport factors should suffice; but at present these should serve merely as a guide, because requirements of commercial and private usage will vary as privately owned and operated planes become commonplace.

Economy should not supersede excess power in privately owned planes as the excessed powered plane can be made very economical in flight by throttling and intelligent use of the mixture control. This point was proven by a comparison of two of our planes, which were identical in structure with the exception of the powerplant, one being equipped with a 90 hp. engine and the other a 200 hp. engine. With the same pay load the 90 hp. plane used 10 gallons per hour, and averaged 80 miles per hour cruising speed, while the 200 hp. plane throttled down used 12 gallons per hour and averaged 100 miles per hour cruising speed, which gave 25 per cent greater efficiency when based on the familiar Load times Speed formula. Excess power is the foremost

safety feature in any plane, and is highly desirous—because a fast climbing plane gives one better and quicker control, takes a shorter run, climbs out of smaller fields and gives the pilot greater latitude in case of engine failure on taking off.

Visibility is exceedingly important, both in the air and while landing or taxying, the strongest built and best flying plane is not safe if blind. Landings on strange airdromes and flying in inclement weather are every day hazards which require the best visibility it is possible to incorporate in the airplane design. One of the much discussed questions is that of the advisability of enclosing the pilot, and whether cabin planes which enclose the pilot are safe. The first Air Service transport plane had the pilot enclosed in the cabin; this was the Glenn Martin transport. But later designs such as the L. W. F. and the present Douglas Transport have the pilot's cockpit open and merely use a windshield for protection. The present Stout All-Metal Monoplanes used by the Ford and Stout Air Lines also have the pilot's cockpit open. The preference of the pilots is for the open cockpit.

Flexible window panes for enclosed cabins are easily discolored and not sufficiently transparent in heavy gages for clear vision—while safety glass panels are strong enough but exceedingly heavy and have a certain amount of diffraction which bothers a pilot when landing.

An enclosed cabin should be so constructed that the pilot could be partitioned off in stormy weather, and open his windows for visibility without subjecting the passengers to any discomforts.

Quick stopping is a most important safety feature, and several of the latest types of commercial planes are incorporating brakes. These include the Buhl-Verville, Stinson, Travel-Air, Ford 3-engined and Fokker. Besides shortening the length of roll when landing, they also aid in taxying in high winds and eliminate the use of chocks under the wheels while warming up.

Folding wings are a desirable feature from the standpoint of easy storage, or towing from one field to another without dismantling, and when folded in place and left in the open, the plane does not require staking down, and can be stored in the average barn.

More attention must be paid to easy entrance and egress of cabins and cockpits and also to the study of muffling the engine exhaust. The whirling chamber type of exhaust manifold has given the most satisfactory results, although it must be remembered that all long exhaust manifolds are the greatest fire hazard on any plane, as proven by the crash tests of the Engineering Division at McCook Field. Metal propellers are coming into more general usage and have many advantages.

The single engined type of private plane can readily be built with a maximum of 250 hp. and should be air cooled. Whether they will always be radial and air cooled is hard to predict, but we can rest assured they will be air cooled regardless of cylinder arrangements.

The government should encourage the marking of all towns and cities, foster the establishing of Municipal Airdromes, standardize night flying equipment, such as landing light, revolving beacons, obstacle lights and illuminated wind cones and "T's." Furthermore, the government should require strict mental, physical, and practical flying examinations, similar to those of the Army and Navy, and should require a periodical physical examination of all pilots similar to the present army 609 examination. This would serve as an index to the physical qualifications of all pilots, and be excellent insurance for the air traveling public.

Possibilities of Night Flying Increase

Travel during hours of darkness now making feasible universal and continued air transportation. Methods of improving safety and effectiveness of such operation outlined by three speakers.

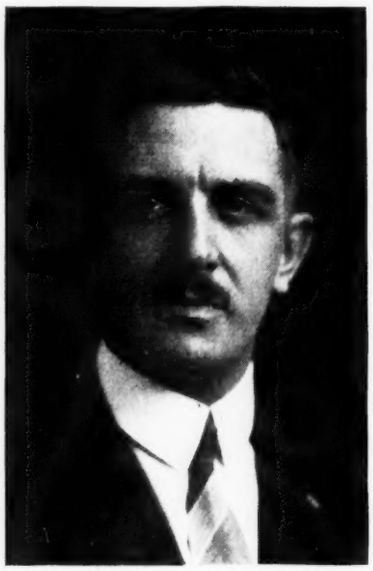
TYING in with the intense interest in the development of night flying which exists at present, due to the realization that the airplane's most useful commercial period of activity is outside of business hours, especially for the transportation of mail and freight, the Air Transport session was devoted chiefly to that phase of commercial aeronautics.

Starting with an outline of the problems the night flying pilot has to face, Wesley L. Smith, air mail pilot, presented a paper based on the experience he has accumulated in years of flying of this type. The first part of his paper was devoted to general considerations of the Cleveland-New York route on which he has been flying, the method of lighting used, and how various other guides, such as cities, trains, automobiles on main highways, etc., are used as guides. In the second part emphasis was laid on the various high performance characteristics which a plane for this type of service must possess, the instruments necessary and their functions. The influence of weather conditions encountered during the various seasons of the year were analyzed also, and the paper concludes with a statement that the most urgent needs of the night air mail service are a beacon ray that will guide pilots through all kinds of weather and communication between fields and pilot enroute to warn him of weather changes.

Lighting equipment of airways, airports and airplanes, which Mr. Smith touched only from a general point of

W. L. Smith, Air Mail pilot, gave a graphic description of night flying conditions in a paper which he presented at the Air Transport session, Friday morning

Left — C. T. Ludington, B. B. T. Corporation of America, co-author of the paper on lighting equipment



Right — H. C. Ritchie, General Electric Co., who collaborated with Mr. Ludington in the discussion of lighting

view of the pilot, were gone into in considerably more detail by H. C. Ritchie, of the General Electric Company, and C. T. Ludington, of the B. B. T. Corporation of America, in a joint paper on "Lighting Equipment for Airways, Airports and Airplanes." The various types of lighting units which have been developed were described in this paper, stationary flying field and intermediate beacons as well as rotating beacons, floodlighting for fields, boundary marking installation, Neon tube lighting as an aid towards fog penetration and various experimental types being covered as well.

With Mr. Smith urging the need for a beacon which will penetrate any kind of weather, and Mr. Ludington admitting that radio beacons might eventually displace some of the lighting of airways, the third paper of this group, "The Stationary and Rotating Equi-Signal Beacon," by Capt. H. W. Murphy of the Army Air Corps, presented by Lieut. L. M. Wolfe, became of unusual interest. Preceding this paper the first showing of a film explaining the function and method of operation of directional radio was given. The present type of radio beacon, according to Captain Murphy, is de-

(Continued on page 438)

Planes of All Types Gather as 1926 Air Races Get Under Way

Several new models seen for first time as speed and efficiency tests start at Philadelphia. Thomas Morse S4E machine wins opening event. Jones captures free-for-all.

By Athel F. Denham

WITH inclement weather conditions delaying the arrival of contesting planes, some of the most interesting of which had just completed the Ford Reliability Tour, the National Air Races at Philadelphia got started on Saturday, September 4. Twenty-five civilian planes were assembled on Model Farms Field when the first event, the elimination race for the Aero Club of Pennsylvania trophy, was started.

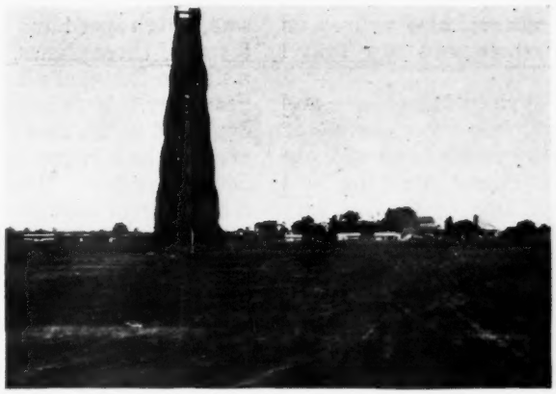
On Sunday, with rain and fog prominent in the Middle Atlantic States, only a few additional arrivals were noted, and it was not until Monday morning, Labor Day, that the list of planes registered at the field grew to any sizeable proportions, over fifty being present at the opening of the day's activities. This number can be expected to increase considerably by the end of the week.

Working from the point of view that developments along commercial lines represent the most important factors in aviation in this country at the present time, the major efforts of the National Air Race Committee this year have been along the line of bringing to Model Farms Field in Philadelphia for demonstration to the public both in the air and on the ground as many of the new commercial planes as possible. To this end nine-tenths of the race prize money has been allotted to those events in which commercial planes only are competing. Moreover, fourteen of the nineteen scheduled events are limited to civilian ships and fliers.

Permitting the public to view the planes on the field from close range was a departure from former National Air Race practice which has been made this year. Formerly, with the majority of the planes attending the races representing the Army and Navy, pickets were established and the public was not permitted on the field. To obviate this, and still comply with governmental regulations, three fields were made available this year, one each for the Army and Navy planes and one for the civilian planes. Moreover, as it was desired to lay emphasis on the civilian ships these were assigned to Model Farms Field where the races themselves are held.

Among the most interesting of the earlier arrivals were two small planes built by the Kreider Reisner Aircraft Corp. to the design of Charles W. Meyers. These ships,

one of which was of the low wing monoplane type, the other being a more or less conventional bi-plane with one of the smallest wing-spreads, 16 feet for the upper and 12 feet for the lower, ever seen in this country, were each powered with horizontally opposed two-cylinder air-cooled engines. The monoplane, moreover, was powered with the new Wright-Morehouse engine which has gone into production only recently and thus appeared at the National Air Races for the first time. The total weight of this ship with fuel and oil is approximately 315 lb. while the Bi-plane weighs only 15 pounds more, powered with the latest type of Bristol Cherub engine.



The main pylon, 150 ft. high and situated in front of the grandstand. Two others of similar design were used to mark the 12-mile triangular course

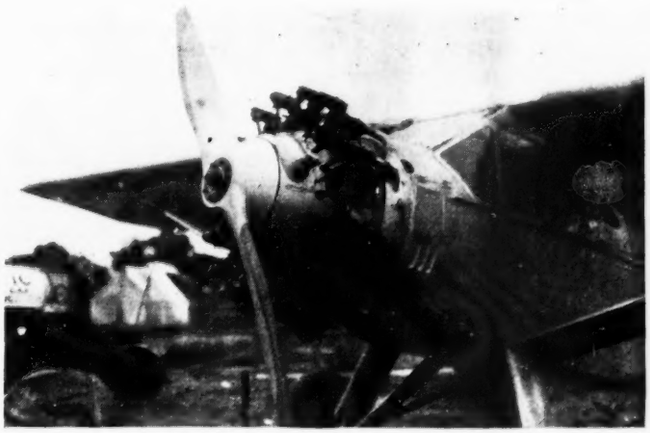
This Bristol Cherub, by the way, although it has developed into the best light plane engine available up to the present time, costs nearly twice as much as a Curtiss C-6, when import duties and other costs of bringing it over from England are taken into account. It is no wonder, therefore, that the design of a light plane which would have a really first-class performance and would be available at a reasonable price has been considerably delayed in this country.

A further development which was of considerable interest was the first appearance of the new Wright Bellanca monoplane powered with the lastest model of Wright "Whirlwind" engine, the features of which were described in last week's issue. The new Wright Bellanca is built on lines very similar to the plane of the same name which won the efficiency contest for the Aviation Town and Country Club of Detroit Trophy last year, except for its new power plant. The fuselage, however, is of all steel construction as compared with the composite type of construction in the former plane and the landing gear is now of the conventional axleless type rather than the cantilever type used in last year's design. The visibility has also been improved and the pilot and passengers now have a field of vision which is every bit as good as in an open cockpit type of plane.

Designed either for photographing or passenger carrying, the Fairchild Aerial Service Company's Cabin Monoplane carrying three passengers in the enclosed cabin was also of considerable interest, especially as this is the first cabin type airplane of modern design which has been constructed to take an engine of only 90 hp.

Two other ships which appeared for the first time at the National Air Races, although one of them competed in the Ford Reliability Tour, were the Pitcairn Sesqui-Wing and the Orowing, the first of which is a strictly sport or speed two-place plane with a Curtiss C-6 engine, while the latter takes an OX type engine and accommodates two passengers besides the pilot, being adaptable to general use and passenger carrying. This latter is now the cheapest plane of recent design on the market, selling, complete with engine, at $2000. This price has been made possible due to the acquisition by Pitcairn Aviation of a large number of sets of Curtiss Oriole wings at a low price. It is expected that by the time these wings are used up a new type of plane built entirely by Pitcairn will be available at the same price.

Of the planes at present assembled at Model Farms Field, perhaps the leading feature in design is that of employing steel tube fuselages. At least 22 of the



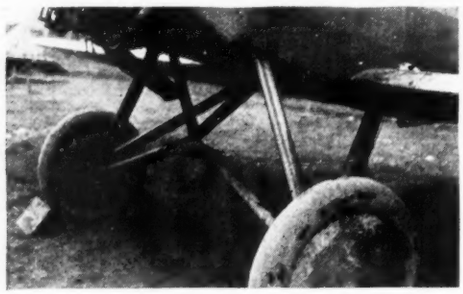
Close-up view of Wright J-5 air-cooled powerplant installed on the six place Bellanca enclosed-cabin monoplane. Neat streamlining of engine and method of collecting exhaust should be noted

A view of the Myers "Midget," which is a miniature plane of the pursuit type. The powerplant is a Bristol "Cherub" of British make. It gives 32 hp. The two air-cooled cylinders are horizontal

The Fairchild enclosed-cabin monoplane carrying three passengers and powered with a 90 hp. Curtiss engine. Folding wings and axleless undercarriage are features

planes present embodied this type of design. Brakes on the landing wheels, a recent development, also figured on four planes, two Buhl-Verville Airsters, and two Travel Air planes.

Aside from the Bristol Cherub, Wright-Morehouse and Whirlwind engines mentioned before, four other engines of modern design appeared in the planes present, all of these being Wright Whirlwinds, two in Travel Airships, and two in the Buhl-Verville Airsters. One of these planes



The axleless undercarriage design employed on the Travel Air planes. The shock absorbing element can be seen in the center of the truss. Wheel brakes are also fitted

was the winner of the Ford Reliability Tour and drew a great deal of attention, especially due to the instrument board which serves as a flying salesroom for the Pioneer Instrument Co., one of the chief instruments represented being the new earth inductor compass used by Commander Byrd in his North Pole flight.

There has been little opportunity up to the time of writing to determine what some of the newer planes can accomplish under racing conditions. The On-to-the-Sesqui Race, however, which preceded the National Air Races, was won by Fred D. Hoyt in a Travel Airplane, covering 2558 miles in 31 flying hours. Hoyt came all the way from California and by winning this race Travel Airplanes have won two major long distance contests in the past few weeks, a Travel Air having also won the Ford Reliability Tour. It was probably due to the poor weather conditions that only three of the airplanes originally entered in the On-to-the-Sesqui Race finished the contest. That some of the planes of war-time vintage did not complete this contest is not surprising, but it is unfortunate that weather conditions prevented a demonstration of the superior reliability of more modern planes over the old timers.

On the opening day, in the first elimination race for the Aero Club of Pennsylvania Trophy, Basil Rowe, flying a Thomas Morse S4E with an Aeromarine engine carried off the prize against a Travel Air, two Waco's and two Pitcairn Orowings with an average speed of 109 miles per hour, showing that increased power does not necessarily mean higher speed, as the engine in Rowe's plane had 80 cu. in. less displacement than those in the other contesting ships.

The second event held on the opening day, a free-for-all race for two, three or four-place airplanes, was won as usual by C. S. Jones, who has now captured this event three years running. "Casey," by clipping another foot off the lower wing of his well-known Oriole, boosted his speed up to 136 miles per hour for the 84 mile course, the runner-up, a Pitcairn Sesqui-Wing flown by James G. Ray averaging 127 m.p.h. for the course. In this race two planes were forced down by engine trouble of a minor character, one of these being one of the new Wright J-5 engines in a Vought airplane.

Monday's first event, a Novelty Relay Race, was designed to bring out the qualifications of planes as to quick getaway, high speed and short landing, the race being between teams of three planes, each of which was required to deliver a flag to the next plane of its team before the latter could get away. It failed to do this, however, as a good deal depended in the race on the sprinting ability of the observers who had to run approximately half a mile in order to deliver the flags. The event was won by Basil Rowe's team consisting of two Thomas Morse planes and a Waco, the total elapsed time for the planes and sprinters for this 36-mile race being slightly over 25 minutes, representing an average speed of 86 miles per hour. It need hardly be mentioned that the sprinters did not contribute much towards this average, considering the muddy condition of the field.

The second and final event of the day again failed to give the modern planes an opportunity to demonstrate their qualities as it was confined to National Guard Planes, all of which were Curtiss Jennies of war time vintage with Hispano Suiza engines. This race did, however, again serve to show the much higher efficiency of the duralumin propeller over the wooden type, the winning ship, which was the only one equipped with this type of propeller, having a speed four miles per hour faster than any of its sisterships.

Without question the arrival of more of the newer planes, and their competing in the races scheduled for the remainder of the National Air Race Week, should tend to present a better picture of the more modern developments in airplanes. There seems to be a necessity to educate the public in an understanding of the conditions governing the design of modern planes. In former years, where interest centered on Government planes, speed races represented the best method of gaging whatever improvements in performance, the major factor, had been achieved. With commercial or civilian machines holding the foreground this year, such speed races in themselves are not sufficient to demonstrate advances in design. Reliability and efficiency, the two features which are stressed most in designing an airplane for the commercial market, necessarily serve to detract from the speed which can be achieved when these items are regarded as more or less secondary. Incorporating efficiency contests in some of the events helps to give some idea as to this feature, but races on the principle of the On-to-the-Sesqui event are necessary to bring out what has been achieved along the line of providing safety and reliability. Moreover in analyzing races of the latter type it is also necessary to take into account weather conditions.

Such exhibitions as that given by three new Curtiss "Hawk" fighters which for over an hour were made to perform a series of stunts in formation for the amusement of the spectators on Monday, cannot fail to arouse enthusiasm, while parachute jumps, especially with the practically foolproof modern parachute, help to do away with the common fear of crashing when something does go wrong in an airplane in the air. Mention should also be made of the night flying exhibitions which are a daily feature of the program of National Air Race Week. Night flying has been part of the routine in the Army and Navy Air Services during and since the war, but the public has had very little actual first-hand knowledge of this type of flying. With the establishment during the past year of contract air mail routes all over the country, some of these operating at night, actual demonstrations of the use of flood-lighting of landing fields for the alighting of mail planes, and similar events which are part of the National Air Race Week program, should aid in bringing home a better understanding of how some of the problems of commercial air transport are being overcome.

Just Among Ourselves

New Army Research Policy is Hinted

SPEAKING at the S. A. E. Aeronautical dinner last week in Philadelphia, F. Trubee Davison, the new Assistant Secretary of War for Aviation, voiced the belief that the Army should leave fundamental research activity to industry and to those governmental agencies, such as the National Advisory Committee for Aeronautics, which are especially organized for these purposes. Coming from this source, the statement would seem to indicate a probable future policy and as such looks like a logical and efficient way of handling an important question. This does not mean, of course, that the Army is not to continue experimental work of various kinds; the rest of Mr. Davison's speech made that clear. But it would indicate a desire to prevent possible overlapping of functions or activities in governmental departments.

* * *

Speakers at Meeting Hit High Average

AND speaking of the Aeronautical dinner, the Society is to be congratulated on having preserved a very high batting average for quality of speeches despite the presence on the program of six speakers in addition to the toastmaster. Acording to our box score the Society batted .833 for the evening, five out of the six talkers having something very definite to say and saying it with clarity, humanness and vigor. As for being welcomed to a city, perhaps that is necessary like death and taxes, but we doubt it. If all the statistics quoted to banqueteers about the area, population and historical greatness of American cities were placed end to end, it is our sincere belief that they would reach from the middle of the Palaeolithic age to the far end of Hamtramck. And if placed one on top of the other—! !! Why, they'd surely topple over and engulf us all in one fell swoop of boredom.

* * *

W. B. Stout Gets Airplane Ride!

AN event of special interest at the dinner was the wining of a prize of a free airplane ride in a Pitcairn plane by W. B. Stout, the all-metal plane expert. The prize came as a result of his holding one of the twenty-two lucky numbers drawn in connection with a Pennsylvania Section stunt. Small pasteboard airplanes, each bearing a number, were launched from a balcony into the banquet hall. Each diner got a plane and the numbers later were pulled out of a hat by A. K. Brumbaugh. This eminent number-puller announced to Mr. Stout in particular and to all assembled in general that the prize rides were transferable. The prizes were made available through the courtesy of the Pitcairn organization.

* * *

Canadian Production Hasn't Dropped Yet

CANADIAN automobile production hasn't done any such tail spin since the introduction of the new duties on April 16 as had been expected in many quarters. In the months of May, June and July, Canadian output was 61,893 automobiles as compared to 47,599 for the same period last year, an increase of just over 30 per cent. In the three months preceding the imposition of the duties—January, February and March—the 1926 Canadian output exceeded that of the same period last year by a little over 45 per cent, the figures being 56,691 for 1926 and 39,029 for 1925, according to data published by the Dominion Bureau of Statistics. While general business conditions and seasonal trends as well as the possible necessity on the part of some companies for using up inventories before curtailing operations, affect the matter to some extent, the figures do seem to indicate that Canada is going to remain in the picture as a producing country. It's too early to get a final answer on the basic influence of the duties, but these early figures are interesting indications of the probable trend.

* * *

Chickens Come Home to Roost!

SEEMS as though we can't have any fun pointing out other people's mistakes at all. Our own armor always seems to develop a flaw somewhere. Here's what descended on us from a constant reader as soon as last week's issue got through the mails: "When Mr. Herbert Casson reads your little snort of amusement at the inaptness of his title, "Automatic Giants of America," let us hope that he will be too British to discover that the chuckle is *also* on you. In your review of the same book, *Automotive Industries*, 6-3-26, p. 943 you quote Mr. Forbes as follows. "Most of them (the giants) had only a *modern* amount of schooling. Now, of course, if you are inclined to be Jesuitical, you may claim that a modern education never amounts to anything more than a moderate education at best, but few graybeards would admit that modern is ever synonymous with moderate." But after all there was at least one typographical error in the letter as it came to us—that's some solace.—N.G.S.

Pratt & Whitney "*Wasp*" Embodies Many Original Features

Solid master rod and two-piece crankshaft used in new radial air-cooled airplane engine which develops 425 hp. and weighs less than 1.5 lb. per hp. at power peak.

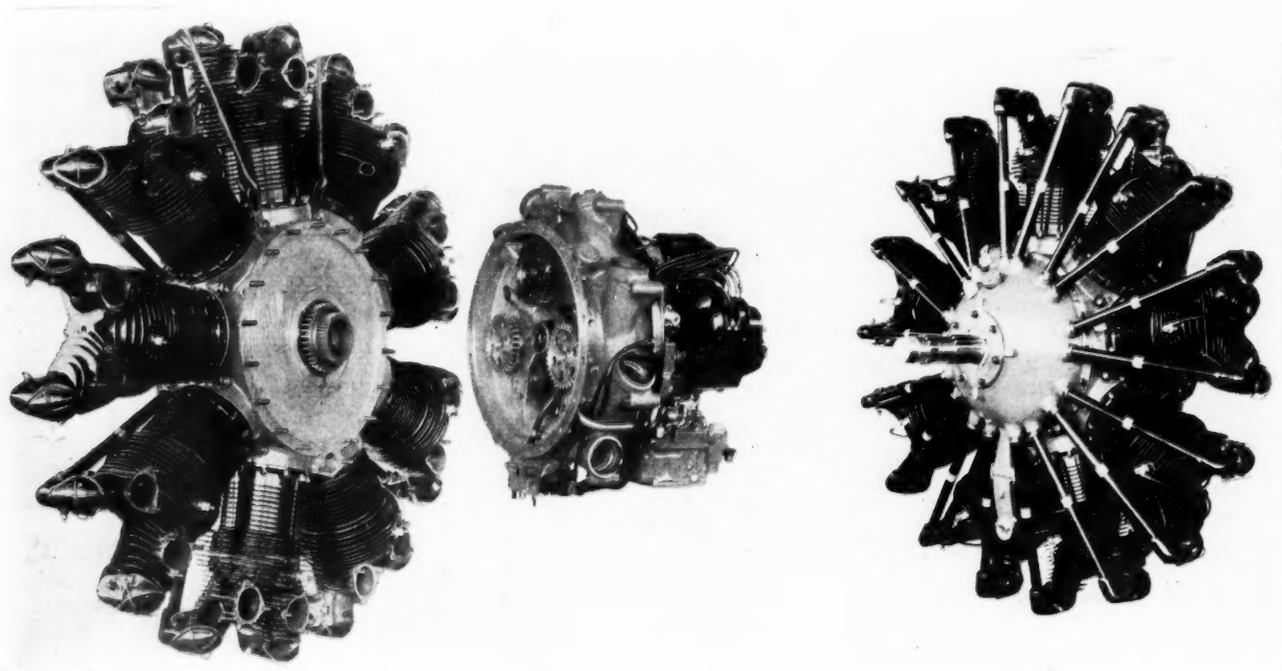
REMARKABLE not only for the immediate success which greeted its product, but also for its rapid organization, the Pratt and Whitney Aircraft Co., in the brief space of a year, has designed, manufactured, thoroughly tested and put into quantity production a radial air-cooled engine of 425 hp., which the Navy is adopting as a standard in all its planes requiring powerplants of between 200 and 500 hp.

The design of this engine, the "Wasp," was begun in August, 1925, and while the design was progressing the newly formed company was acquiring its tools. The first engine was actually finished before the final drawings were completed and was on the test stand December 24 of the same year.

Three experimental engines were first built under contract for the Navy and with the successful passing of the Navy type tests it was put into production. Moreover, Pratt and Whitney, before final acceptance of this engine had become so confident in the correctness of the design that the construction of the "Hornet," of identical design to the "Wasp" but with 25 per cent larger displacement, was immediately begun. The first "Hornet" was ready to run in June, 1926. At that time the "Wasps" in service had already had 300 hours in the air, demonstrating that the confidence of the designers in their product was warranted.

There have appeared from time to time brief descriptions of the "Wasp" in the aeronautical trade press, but as its design was on the secret list of the Navy no actual details have been available for publication heretofore. Some of the data appearing in this article is taken from a paper presented by George J. Mead, vice-president of the Pratt and Whitney Aircraft Co., at the annual aeronautic meeting of the Society of Automotive Engineers in Philadelphia, last week.

The actual maximum horsepower rating of the engine is 425 hp. at 1900 r.p.m., which corresponds to a brake mean effective pressure of slightly over 130 lb. per sq. in., but with a 30 per cent benzol mixture, or its equivalent, the "Wasp" engines develop 140 lb. per sq. in. b.m.e.p., which corresponds roughly to 450 hp. This means that for the first time a radial air-cooled engine has been developed in this country which is the equivalent in power with foreign air-cooled radials. The "Wasp" is actually superior in weight to any engine of its general type of which we are aware at the present time, its total weight being 650 lb.,



Left—Three-quarter rear view of the "Wasp" with the accessories drives and blower sections removed. If desired, the front or power part of the engine can be removed from the plane without disturbing the accessories. Right—Three-quarter front view of the "Wasp" showing the extremely clean design of the nose, and completely enclosed valve-gear

corresponding to less than 1.5 lb. per hp. at maximum power.

This low weight has been obtained not by sacrificing dependability, but by simplification of design. This is better shown by the fact that the engine has been designed to withstand, well within the limits of safety, crankshaft speeds up to 2400 r.p.m., in order that a fighter equipped with this engine may be put into a steep dive at full throttle without risk of damaging the engine.

At the present time the "Wasp" has been installed and flight-tested in three types of planes, the Curtiss Hawk, the Boering Fighter and the Wright Apache. The first two planes were originally designed to take water-cooled power-plants, but in spite of this fact and the weight which was added to the plane by adding a suitable engine mount to take care of the radial, the lower weight of the complete air-cooled powerplant installation offset these factors to such an extent that the high speed is at least as good as with the water-cooled type, while the climb is from 25 to 40 per cent better.

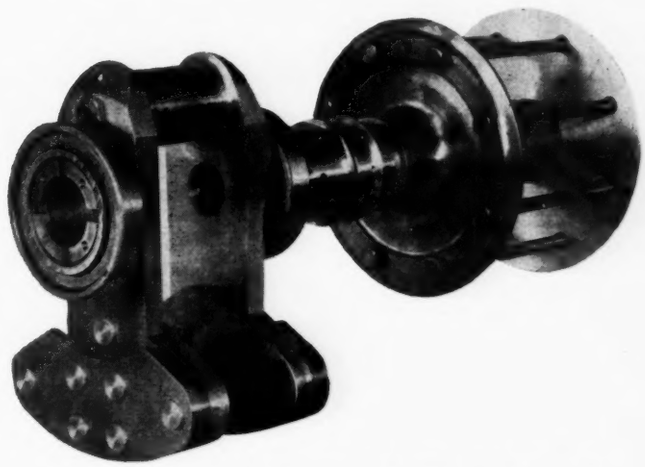
It would normally be expected that in order to turn out an engine in so brief a time, conventional design would have to be largely followed. In the "Wasp" (and of course also the "Hornet, whose design features are identical) there are, however, many original mechanical features. Chief of these is the solid master rod and the two-piece crankshaft. The crankcase also is radically different from conventional design in that it is split in the center plane of the cylinders. Valve gear is completely enclosed, thereby doing away with one of the objections which has often been made to the air-cooled engine. With the announcement during the past week of the latest model of the Wright Whirlwind series the J-5, a definite trend toward enclosing valve gear on air-cooled engines can be said to have been established. A further improvement on the "Wasp" over previous types of air-cooled radials is the complete enclosing of all accessories back of the engine, permitting an efficient cowling of the engine without reducing the accessibility of the various units.

Solid Master Rod

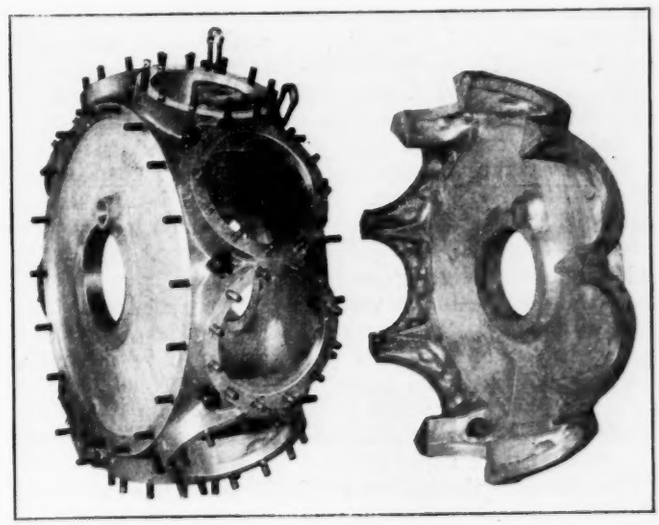
Adoption of a two-piece crankshaft and solid master rod has been due chiefly to two defects which the former type of split rod embodied. Owing to the stepped split necessary in the two-piece rod design, there sometimes developed cracks between the step and the adjacent knuckle pin hole, while due to the necessarily wide spacing of the four clamping bolts, bending stresses were set up in the bolts themselves, resulting sometimes in breaking the bolts of splitting the bolt bosses. In the new one-piece design two babbitt lined bronze bearing shells are merely pressed into the rod, the problem of design being thus shifted to the crankshaft.

The two-piece crankshaft which was finally evolved for the "Wasp" has the crankpin integral with the forward end of the shaft, being split at the front side of the rear crank cheek. As part of the rear section of the crankshaft, a stepped pin, integral with the front side of the rear crank cheek and with the largest diameter steps at the rear cheek, is provided which slides into a correspondingly stepped hole in the crank-pin, passing completely through the crank-pin, thus providing rigidity with ease of assembly. In order to securely lock the two halves of the crankshaft together a hole drilled through the pin and the two halves of the crankshaft are locked together by means of a bolt through the cheeks. By thus splitting the crankshaft a solid shaft is provided between the rod and the propeller hub to take care of the power transmission, there being only the usual frictional and inertia torque reactions in addition to the power required by the accessories drives to be carried by the rear section, while the stepped pin avoids failure due to shearing stresses caused by the bearing loads.

The shaft is carried on three bearings, two of them being NKA roller bearings, shown on the accompanying photograph, while a deep groove ball bearing is provided immediately back of the propeller hub to take care of the thrust as well as some of the radial load. Owing to the two-piece type of construction it has been possible to



Crankshaft used in the "Wasp." The crankshaft is made up of two pieces, the split being immediately in front of the rear crank-cheek. Note design of counterweights and webs made possible by this type of construction. Above—The master rod is of one-piece construction with a pressed in bearing, providing ideal bearing conditions



The main crankcase, which is shown at the left in its assembled form, is made up of two identical halves, one of which is shown at the right. This design provides even distribution of stresses and solid mounts for the two main bearings

extend the crank cheeks beyond the center-line of the crankshaft, the grain being carried all the way down to the bottom of the counterbalances, providing a substantial means of attaching the counterweights. In the original calculations these webs were designed only for centrifugal loading and stresses due to acceleration and deceleration in the plane of the weights. Recent experience, however, has shown that gyroscopic forces had to be provided for, these forces being caused by rapid plane maneuvers, especially in fighters. The two counterweights which are attached to the shaft consist of two steel sectors notched to fit over the web, which is flared out at the outer end, the flare holding the weights, while mortising prevents skewing action on the crank web. With all unbalanced forces thus taken care of, and with the inherent dynamic balances existing in the radial type of engine, a smooth running powerplant results.

Two-Piece Crankshaft

Previous types of radial engine designs incorporated a crankcase of the cup type with an open end, one main bearing being carried in a separate plate. In order to provide more rigid crankshaft support this design was departed from and a forged aluminum crankcase consisting of two identical halves, joined in the center plane of the cylinders by nine bolts, one between each two cylinders, was provided. Due to the symmetrical type of construction the load is divided equally between the two main bearings and, moreover, production is simplified to a considerable extent.

The nose section, which in itself, taken with the front crankcase forging, constitutes a separate assembly, is hemispherical in shape, carrying the thrust bearing in its center point, assuring an equal disposition of stresses due to the thrust. The valve tappet guides are also carried in this section, while included in the front end assembly is the cam drum which is driven from the crankshaft by means of spur gears, teeth being provided on the internal side of the drum.

An entirely separate assembly is formed by the rear section of the "Wasp," as is shown in the accompanying photograph. This section consists of two parts, a blower section, containing a General Electric impeller driven at five times crankshaft speed, or about 10,000 r.p.m. normal speed, and the accessories section at the rear. To simplify maintenance in service the engine supports have been placed on the blower section, so that, if desired, the power end can be removed from the plane without disturbing the accessories and a new power section substituted. In designing the cylinders it was considered advisable to obtain the most ideal shape of combustion chamber rather than to restrict it to decrease the overall diameter, the additional power thus obtained being sufficient to more than offset the increased drag. As a result a hemispherical chamber has been adapted, which is combined with a concave type of piston, this shape providing good turbulence and minimum radiating surface. To provide good cooling of the valve seats, the valves have been placed in a plane at right angles to the crankshaft and at a large included angle. Intake and exhaust ports are open to the rear, which should also tend to improve cooling conditions by permitting better air flow around the heads. With this arrangement, either an exhaust collector or straight muffling stacks can be used.

The cylinders themselves are built up with a steel barrel with integral cooling fins onto which is screwed and shrunk an aluminum head, into which the bronze valve seats are shrunk, the spark plugs also being screwed into the head. Considering the fact that it is possible to run the "Wasp" with a fuel consumption of 48 lb. per hp. per hr. on straight gasoline, cooling of the head and cylinder seems to be ample in this engine.

Valve rocker-boxes form an integral part of the aluminum head. These boxes are provided with a quickly detachable cover, enclosing both valve rocker and valve springs. By providing a telescopic enclosure for the push rods, the entire valve gear has been enclosed, but remains readily accessible for inspection. To avoid the daily removing of rocker-box covers in order to lubricate the rockers, the rocker is mounted on small ball bearings, while valve springs can be removed without disturbing the rocker assembly. In order to take care of elongation of the cylinders, timing compensation is provided in the cam and tappets. Particular care is taken to cool the exhaust valve guides which are extremely long for this purpose, this also assuring accurate seating of the valves.

A Stromberg double carburetor supplies the fuel mixture to the before mentioned impeller, which in turn delivers it to an annulus through diffuser vanes. Tangential pipes lead it from there to the cylinder intake ports.

Grouping all the accessories in the rear of the engine provided a considerable problem, considering that ten separate drivers were necessary for the two magnetos, starter, tachometer, generator, oil pump, fuel pump, supercharger, and the two-gun synchronizer heads required for government engines. Moreover it was desired to keep this assembly as light and compact as possible, as well as to keep the number of gears down to a minimum.

The final method adopted was of providing three horizontal shafts, 120 degrees apart, all driven from the crankshaft by a single spur gear through a spur step-up. The top shaft is connectted by means of a dog clutch to an Eclipse momentum starter, while it also takes care of the generator drive by means of a pair of bevel gears. Each of the lower shafts drives a Scintilla magneto at it rear end. They each also drive a vertical shaft through three bevel gears. These vertical shafts drive the synchronizers at their upper end, as well as the tachometer, through a worm gear reduction, while the fuel pump is driven from the lower end of the left shaft and the oil pump from the lower end of the shaft on the right side of the engine. The starter is located above and between the magnetos, while an elbow, which is a part of the magneto support, carries the carburetor. A large oil strainer chamber is provided ahead of the carburetor together with an easily accessible oil pressure regulator. The usual instrument connections, which include connections for an oil temperature gage, and oil and fuel pressure gages, are provided.

In the "Hornet," which as has been mentioned, is identical in design to the "Wasp" except for its 25 per cent larger piston displacement, provision is also made for propeller reduction gearing, this engine being built with and without this gearing. At the present time no performance figures are available regarding the "Hornet," but considering that it is identical in design with the "Wasp," the b.m.e.p. developed should be approximately the same, which with the higher piston displacement should provide a maximum of 550 to 560 hp., thus adding to the line of air-cooled engines available in this country an engine which will provide keen competition for the water cooled engines of 600 hp. or more.

A NEW road is to be built between the great English industrial center, Manchester and the seaport of Liverpool at a cost of $15,000,000, of which the Government will provide 75 per cent, the rest evidently being furnished by municipalities along the route. The city of Manchester is not contributing anything to defray the cost as the city government fears it will be harmful to the ship canal.

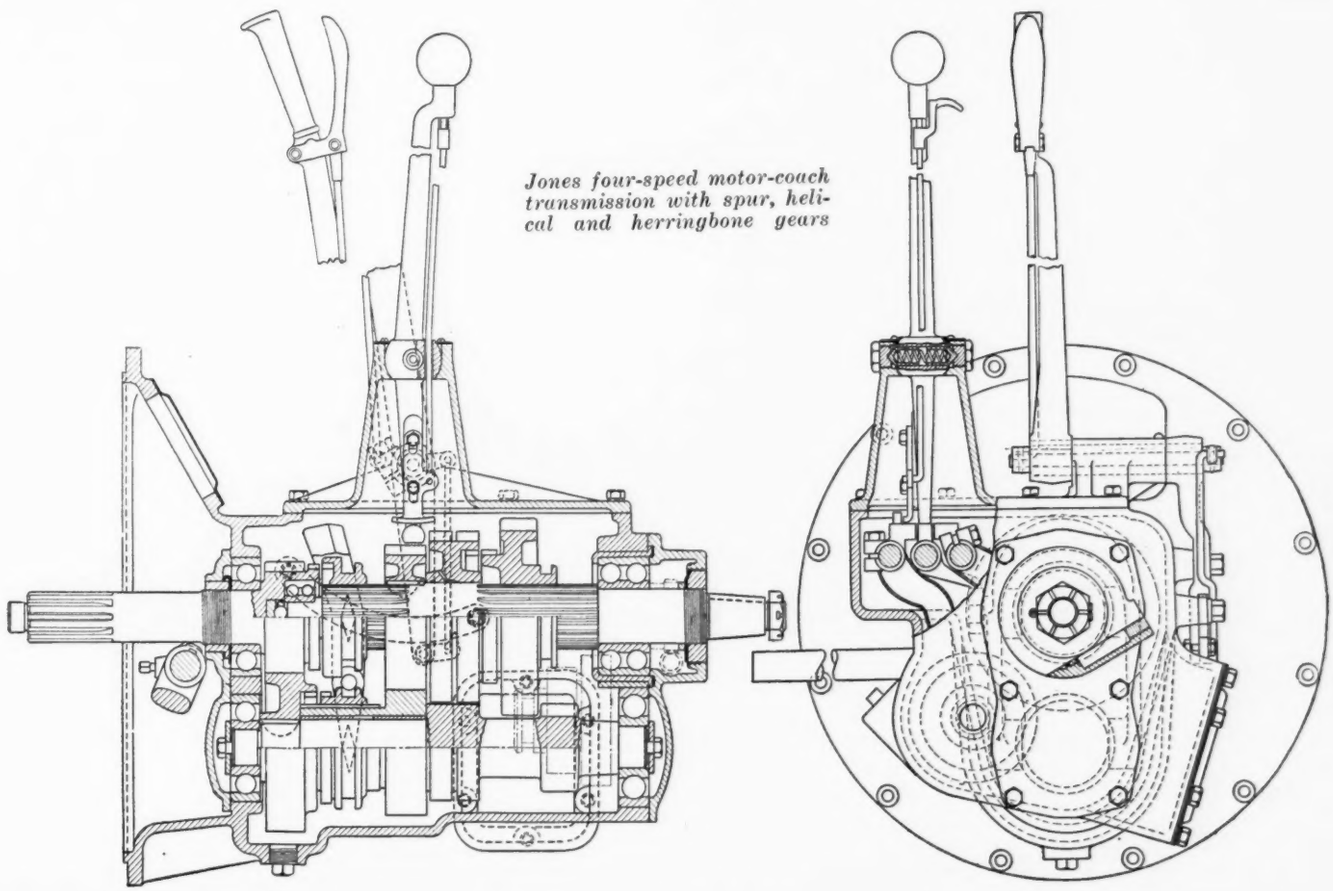
New Passenger Car Transmission Has Over-Geared Fourth Speed

Four-speed transmission for motor coaches also developed by Ohio Manufacturing Co. and improvements have been made on the regular three-speed type

IN addition to the three-speed transmission and plate clutch brought out by the Ohio Manufacturing Company, Upper Sandusky, Ohio, something over two years ago, and which were described in *Automotive Industries* of February 7, 1924, the company has now brought out a four-speed transmission for passenger cars with over-geared fourth speed, and a four-speed transmission for motor coaches. Several improvements have been made also in the regular three-speed passenger car transmission previously announced. It is claimed that with this transmission it is possible to change from third to second speed at the highest speed at which the car can be driven, thus adding an element of safety. The same thing is possible with the four-speed transmission, and the shift from the highest to the next-highest speed is said to be possible without injury to the transmission, the universal joints and the rear axle, and without clashing, since the clutch is "eased-in" after the shift is made.

The light four-speed transmission is made in two forms, with either the third or the fourth speed the direct drive. The constant mesh set for the second speed is made with special teeth of 20 deg. pressure angle and 8-7 diametral pitch. The third speed being the direct drive, the fourth is geared up in different proportions, the greatest speed increase over the direct drive being 22 per cent. The front end drive gears on both of these transmissions, as well as on the four-speed type, are cut with helical teeth and therefore operate comparatively free from noise. This, together with the fact that for a given car speed the engine speed is reduced by as much as 18 per cent, the car drives very nicely on the over gear. When driving on the over-gear the fuel consumption is reduced, as is also the wear and tear on the engine.

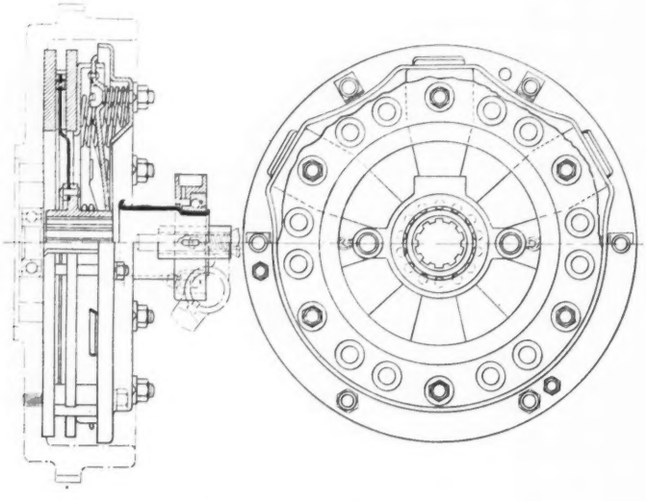
For the low speed and rev rse gears full depth 7-pitch, 20 deg. pressure angle teeth are used. No stub gears are used in any of these transmissions, the 8-7 pitch



Jones four-speed motor-coach transmission with spur, helical and herringbone gears

special gears evidently having a greater depth of tooth than the so-called full depth.

The four-speed coach transmission, to which reference was made above, is being tested on three different makes of bus, we are informed. The principal advantages claimed for this transmission are ease of gear shifting and silent operation. All gears are made of S. A. E. No. 2320 steel, which is case hardened. The shafts are made of the same material and the main drive shaft is cut with 16 splines of the involute type, with 20 deg. pressure angle and 8-20 diametral pitch. The second speed gears in this transmission are of the herringbone type and remain in mesh continuously.



Jones single disk clutch

In addition to the types above referred to, the Ohio Manufacturing Co. has brought out two conventional type transmissions with three and four speeds respectively, which have a capacity for handling vehicles up to 2½ tons weight. These have full depth teeth throughout.

The clutches made by the Ohio Manufacturing Co. are made in both the single disk and the double disk types, in 10, 12 and 14 in. sizes. One of these clutches is illustrated herewith.

The transmission illustrated is the motor coach type, which gives four forward ratios of 4.00, 2.59, 1.55 and 1 to 1, and a reverse ratio of 5.32 to 1. This transmission comprises spur gears of 5 diametral pitch and helical gears of 6.512 d. p.

Factory Window Illumination

THE benefits of clean windows in factory operation and the most efficient means for controlling natural light through windows were two subjects of interest to factory executives which were discussed at the Convention of the Illuminating Engineering Society at Spring Lake, N. J.

H. H. Higbie, University of Michigan, stated that control of natural illumination in interiors by means of Venetian blinds is much better than control by shades covering the lower sash which itself is better than control by shades covering the upper sash. Window shades in ordinary use, he said, transmit very little light but exercise control by absorbing and destroying light. In contrast Venetian blinds redistribute the light rather than absorb it.

If the slats are sloped down inward and are of light color a large part of the light is either thrown directly to the rear of the room where it is most needed or is thrown to the ceiling and from it reflected back to working levels at the rear. Mr. Higbie has conducted a number of tests to determine what portion of the total illumination at any point in a room is obtained directly from the windows and what portion is reflected from the bounding surfaces of the room. Details of these tests were presented in his paper.

In a report of investigations concerned with the effect of clean windows on interior illumination, W. C. Randall and Allen J. Martin, of the Detroit Steel Products Co., gave the following conclusions:

1. That after four months with the windows uncleaned the amount of light which they transmit was only from 25 to 50 per cent of that for clean windows.
2. That the rate of decrease in transmitting power was greatest when the windows had just been cleaned.
3. That about 75 per cent of the decrease in transmitting power was due to dirt on the inside of the windows.
4. That the type of glass used made comparatively small difference in the amount of dirt collected.

Packing Materials Discussed

IN the manufacture of practically all kinds of products the last operation consists in the packing of the goods. Primarily the packing serves to protect the goods against injury during shipment, but in some cases it serves to make them more attractive in appearance and therefore more salable. Immense quantities of material are used for the packing of shipping cases, etc., and it is obvious that great losses may result from the use of packings more substantial than necessary, while on the other hand, too light packings are even more wasteful. The general subject of packings is dealt with on a broad basis in a book entitled **Wirtschaftliches Verpacken** by Dr.-Eng., E. Sachsenberg, published by the VDI Verlag, Berlin NW-7, Germany.

The principal packing materials are wood, metal, cardboard and paper, fiber, textiles, glass, porcelain and straw. These different packings are discussed consecutively in the first part of the book. Wood packings are subdivided into regular packing cases, laminated wood cases, crates, baskets and barrels. The discussion of wood packing cases is largely based on the work of the Forest Products Laboratory. In a similar way the packings of all of the other materials are subdivided and discussed from every point of view. Those who have to deal with extensive shipping problems and who are familiar with the German language will no doubt find much in Sachsenberg's book that is of practical interest to them. The price of the book is 6.70 marks in paper covers and 7.80 marks in cloth.

THERE were 58,784,073 automobile and truck tires manuactured in this country during 1925, an increase of 29.4 per cent over 1923 production, while the value of 1925 production increased 43.3 per cent over that of 1923.

These figures have been compiled by the Department of Commerce from data collected at the biennial census of manufactures, 1925. In the following table are presented some data pertaining to the tire industry:

	1925	1923	% Increase or Decrease (—)
Number of establishments..	126	160	—21.2
Wage earners—Avg. number	81,670	73,963	10.4
Total value of products.....	$824,548,604	$569,130,559	44.9
Pneumatic casings. Number	58,784,073	45,425,591	29.4
Pneumatic casings. Value..	$656,491,733	$458,107,709	43.3
Inner tubes. Number.....	77,387,836	57,229,225	35.2
Inner tubes. Value.....	$118,234,658	$74,982,725	57.7
Solid truck. Number.....	1,035,226	944,337	9.6
Solid truck. Value.....	$43,870,387	$29,060,586	51.0

Books for the Business Bookshelf

Making of Iron and Steel

On the Metallurgy of Iron and Steel. F. T. Sisco, Dr. Bengt Kjerrman and Dr. Birger Egeberg. American Society for Steel Treating, Cleveland. 193 pp. Illus. Paper cover, $1—Cloth cover, $2.

FERROUS metals play such a large part in the manufacture of automotive products that it is desirable for engineers to have, at least, a basic knowledge of the methods and processes employed in the steel industry. This book, which has been reprinted from the Transactions of the A.S.S.T., furnishes an excellent source of authoritative information on the subject. In the first section of the book Mr. Sisco discusses the manufacture and mechanical treatment of iron and steel; the manufacture of wrought iron, malleable iron and semi-steel; the chemistry of iron and steel, of the blast furnace and the Bessemer process, of the open hearth and electric furnace processes and of wrought iron and crucible steel.

In the short second and third sections of the book Dr. Kjerrman presents some comments on Swedish steel practice and Dr. Egeberg discusses electric steel manufacture. The work should prove of considerable value to anyone wishing to obtain accurate information about the processes of making the various kinds of steels.

Our Country's Business

Commerce Year Book—1925. Department of Commerce, Washington, D. C. 752 pp. Illus. $1.

INDUSTRY and commerce of the United States during 1925 reached the highest levels ever attained in our history, not even excepting the years of abnormal war activity. Thus begins the summary of the information contained in this latest volume of statistical data pertaining to our business activities.

To all who have seen previous volumes of the Year Book there is no need of emphasizing the value to every business man of the immense amount of data and information contained in this volume, which is at least equal, and probably superior, to previous issues. At the very low price it is offered for sale there would seem to be no reason why a copy should not be in the hands of every man at all interested in industry or commerce.

History of Transportation

The World on Wheels. H. O. Duncan. Published by the Author, 32 Rue des Mathurins, Paris. 1200 pp. Illus. $20.

THROUGHOUT the ages the development of transportation methods has paralleled the progress of civilization and few subjects contain more matters of interest to the public. There have been intrigues, heroism, romance, adventure and all the other elements of the conventional "best seller" connected with the world's transport developments and they are all to be found in this most interesting work.

Mr. Duncan has been connected with the transport industry for over 40 years so that much that he writes is enlivened by personal knowledge or experience. From the immense amount of material presented, the vast research necessary for the book is evident but the result is a volume which contains, probably, a more complete and authoritative non-technical account of the birth and growth of the motor industry than has ever before been published. There is so much of interest to the American automotive industry that a more detailed discussion of "The World on Wheels" will be presented in another issue of *Automotive Industries.*

For the Diesel Operator

Diesel Engines. David Louis Jones. The Norman W. Henley Publishing Co., New York. 565 pp. Illus. $5.

THIS book is intended to be a practical guide to the principles, care and operation of Diesel engines for operating engineers. Because of the relatively small experience with this type of engine in America the author believed that there was a scarcity not only of competent Diesel engine operators but of practical manuals covering their operation. The present book starts out with an exposition of the fundamentals of thermodynamics and the elementary principles of Diesel engines. Then follow chapters devoted to construction details, methods of operation and descriptions and explanations of representative types of engines. The later chapters discuss particular Diesel applications such as in submarines, ships, railroad work and the properties of lubricating and fuel oils.

Tooling Turret Lathes

Modern Tooling Methods for Turret Lathes. M. E. Lange. The Warner & Swasey Co., Cleveland. 126 pp. Illus.

INCREASED production and greater variety and range of work produced by turret lathes is made possible by modern turret lathe tooling and this book aims to show how these desirable results may be acquired. The first chapter contains suggestions for increasing production through the use of multiple cuts, combined cuts and rigid tooling and also how to reduce tooling costs and set-up times. In later chapters the problems of bar and chuck work are discussed, typical tool layouts given, design of individual tools treated and general suggestions made for increasing production.

Chucks and Spindles

The Spindle Book. The Jacobs Manufacturing Co., Hartford, Conn. 95 pp. Illus.

A WORK which should be valuable to all users of machine equipment upon which drill chucks are used is this small book which contains a rather complete listing of all the makers of such machinery, their products with model designations and sizes, together with the method employed in fitting chucks to the spindles. The equipment listed is classified according to its use, the classifications including drilling machines, portable tools, tapping machines and attachments, lathes, screw machines and centering machines, wood-working machinery, valve refacing machines, drill and tap grinders and other special purpose tools.

STARTING in 1911 with a department of health and sanitation, the Norton Co., Worcester, Mass., has taken definite steps toward proper care of the personnel of the factory. All activities of this nature are now under a service director who reports to the general manager. The departments grouped under the head of service are: Employment, health, sanitation, dental, athletic, catering, safety engineering, housing, visiting nurse and education.

A history of the growth of these activities is presented in a small book prepared by W. Irving Clark, M.D.. and published by the Norton Co.

Patent Extension Bill Opposed as Unfair to Automotive Manufacturers

Manager of N. A. C. C. patent department calls attention to objectionable features of proposed law which would extend life of patents granted to inventors who served during war.

DURING the last session of Congress a bill, S-3745, was introduced providing for the extension of the time of limitation under which patents were issued in the case of persons who served in the armed forces of the United States during the World War.

This bill provided for an extension of such patents for a term of seven years from the expiration of the normal term. The American Patent Law Association held a referendum on this bill and expressed its disapproval in overwhelming numbers. Among the prominent members of the Association who opposed the bill was Robert A. Brannigan, manager of the patent department of the National Automobile Chamber of Commerce.

No Chance to Protest

The American Patent Law Association communicated with the Senate and House Committees on Patents, expressing its disapproval of the bill and requesting that it be notified if any hearings were held. No opportunity was given to present any arguments nor was the Association committee notified of any hearings.

Shortly after this communication to the Senate and House Committees, the House and Senate substituted bill S-4480 for bill S-3745, and the subsituted bill was promptly and favorably reported out on the last day of Congress, July 3.

This substitute bill, S-4480, provides for an extension amounting to three times the length of the patentee's service in the armed forces of the United States.

Since the extension of a patent deprives the public of its anticipated right to use the invention on expiration of the patent and also prohibits improvers from using their own inventions until the expiration of the extended terms, it appears that the proposed legislation has many aspects likely to result unfavorably from the standpoint of the automotive manufacturer.

The automotive point of view on this important question is well expressed in a recent communication to *Automotive Industries* from Mr. Brannigan. Referring first to his opposition to the original bill, S-3745, Mr. Brannigan writes:

"My disapproval was based on the following grounds. Other things being equal, it is a great hardship on manufacturers and others who base their plans on the fact that a patent has a seventeen-year life and when that period has expired they will be free to use the invention in question. If in the middle of the life of a patent, an extension is given, no manufacturer or other concern that uses the invention will know where they stand.

"A patent represents a contract between the inventor and the public at large and if the terms of the contract are varied by one party, it is liable to work great hardships on the other.

"I wish to make it clear that I am, of course, in favor of any proper means of reimbursing veterans of the World War for any loss or injury that they may have sustained by reason of their services, but I question whether this Senate proposal comes in the scope of proper means. Under the general statutes, if one makes an invention and there is a disclosure of the same thing in a printed publication anywhere in the world, or a public use of that invention in the United States, the inventor must file his application for a patent within two years thereafter or he is barred. Shortly after the war, Congress, considering that this statute of limitation had possibly barred inventors who were giving war services, passed a statute extending the time for filing applications of patents by veterans who would otherwise be barred by the statute. To my personal knowledge that worked hardships on the manufacturers."

Then, going into a further discussion of the implications of the new bill as well as of the old, Mr. Brannigan continues:

"Senate Bill No. 3745, I believe, provided for a seven-year extension which was obviously too long. I note that the substitute bill S-4480 provides for extensions of three times the length of the patentee's service. As the participation in the war was twenty months and many men were not mustered up until some time afterwards, in certain cases the period of extension would be in excess of the seven-year period. I haven't seen this substitute Senate bill, but unless it is carefully drawn, it might result that anyone in the regular Army, Navy and Marine Corps who continued in service, might obtain a patent of indefinite length.

Inventors in Two Classes

"Moreover, inventors who served during the war can be divided into two classes—those having no particular resources and who dropped from civilian activity during the period and who, therefore, might have suffered loss due to their inability to administer their patent rights; and those, such as the commissioned personnel, giving special services to the government, many within the United States who were able to keep more or less in touch with their private activities. In this second class many of these men enlarged their knowledge along their own special line and were thus benefited rather than harmed.

"Therefore, I think these bills are objectionable on two grounds—one, that the philosophy of the proposition is false, because while it may tend to cure an injustice

to certain inventors, it does so to the expense and harm of innocent manufacturers; and second, aside from the erroneous philosophy, the bills are entirely too sweeping."

Finally, Mr. Brannigan summarizes as follows:

"I hope Congress will not enact any of these present proposals into laws, but if it should, I sincerely hope that the statutes will provide; first, that the burden shall be on the inventor to demonstrate to the Patent Office that he suffered actual loss in the administration of his patent due to his participation in the war, and even if the patent were then granted if suit were brought on the patent, the defendant would have the right to show that no such actual loss did ensue, in which event the patent would be void."

Co-operative Steel Tests

THE Iron and Steel Division has decided to improve upon the present physical property charts of S.A.E. steels and to that end has arranged for simultaneous tests by a large number of interested concerns. The objection made to the present property charts is that they show the lowest physical values that may be obtained with steel of the particular specification, and it is thought preferable that the curves should show average values based on so-called frequency curves. As a first step in this direction tests are to be made on S. A. E. No. 6130 steel.

To make the results of the tests as representative as possible, 36 Division members and others interested in the work agreed to participate in the cooperative tests.

The steel was furnished by the United Alloy Steel Corporation, Central Steel Co., Bethlehem Steel Co., and the Interstate Iron & Steel Co., and was shipped to Chairman Watson for cutting and keying the blanks. Twelve 1-in. round test-blanks were sent by Mr. Watson to each individual cooperating, the blanks being marked as follows:

A-1	B-1	C-1	D-1
A-2	B-2	C-2	D-2
A-3	B-3	C-3	D-3

The instructions for carrying out the tests were as follows:

Testing Instructions

(1) Analyze bars A-1, B-1, C-1 and D-1 for
- Carbon
- Manganese
- Phosphorus
- Sulphur
- Silicon
- Chromium
- Vanadium

(2) Heat and quench all test-bars as follows:
- (a) Heat to 1600 deg. fahr.
- (b) Hold for 15 min. at that temperature
- (c) Quench in water

(3) Draw as follows:
- (a) The four bars marked "1" at 800 deg. fahr. for 1 hr.
- (b) The four bars marked "2" at 1000 deg. fahr. for 1 hr.
- (c) The four bars marked "3" at 1200 deg. fahr. for 1 hr.

(4) After drawing cool all bars in air

(5) Grind flat surface on side of all bars near center of length and make Brinell, scleroscope and Rockwell tests approximately 1 in. from end

(6) Machine to standard 0.505-in. tensile test-bar; threaded ends preferred, but not essential

(7) Make standard tensile-test determining
- (a) Yield-Point or Drop of Beam
- (b) Ultimate-Strength
- (c) Per Cent Elongation in 2 In.
- (d) Per Cent Reduction of Area

(8) In report on results submit the following information:
- (a) Type of tensile machine used and rated capacity
- (b) Speed of tensile machine
- (c) Sketch of test-piece employed

The decision to develop charts based on "frequency" curves was made by the Division after it was agreed that the charts now printed in the S. A. E. Handbook indicate the worst possible conditions only, whereas charts based on "frequency" curves indicate the values most likely to obtain in the average heat-treating department.

The present physical-property curves are based on minimum figures for the tensile-strength, yield-point, reduction of area, and elongation, based on the following considerations, the heat treatment being constant:

(1) The lowest yield-point and tensile-strengths are produced with steels at the bottom of a given range in carbon

(2) The lowest reduction in area and elongations are produced with steels at the top of a given range in carbon

It is expected that the results of the cooperative tests will be available early in October so that a meeting of the Iron and Steel Division can be held at that time to decide whether the present basis for the physical-property charts should be discarded in favor of "frequency" curves.

New General Motors Building

NEW YORK will have a new General Motors Building when the proposed 22-story addition to the three story Colonade Building is completed. The Colonade Building, occupying the block bounded by Broadway, 8th Avenue, 57th and 58th Streets, was constructed in 1922 with the proposed addition in view so that in general the present foundations are suitable.

The new building, only a block from Columbus Circle, is in the heart of the automobile district. It is understood that General Motors Corp. has signed a 21-year lease for the upper 13 floors of the building, an area of about 200,000 sq. ft., for a total rental of about $15,000,000.

In addition to General Motors, the building agents state that several other automotive firms, including Hudson Motor Car Co. of New York, Rolls-Royce of America, The Warren-Nash Motor Co., Rickenbacker Motor Co., Astor Cab Co., American Automobile Association and Metropolitan Automobile Association, are leasing space in the new building.

A COMPANY is being formed in Japan for carrying on a commercial air service which is to rival in magnitude the similar services in France, England and the United States. To make such a service possible Government aid is necessary and a subsidy of $5,000,000 is contemplated. The object, of course, is to develop an industry and a force of trained pilots which could be drawn upon in case of war. It is felt in Japan that building up a sizable air force is much preferable to enlarging the navy, because of the lower cost. In this connection we learn from a British publication that the present fleet of Imperial Airways, Ltd., consists of fourteen planes with a total seating capacity of 178.

OUR loquacious old friend, the veteran body builder, who amused us several weeks ago with his theories on future developments in body design, is with us again in this issue. This time he draws upon his broad experience in the general automotive field to discuss the paradoxical situation which he finds in American and European car design trends. He has discovered, he says, that the Americans are busy imitating the Europeans and the Europeans are busy imitating the Americans! Each, apparently, thinks the other's ideas are the best, he says.

Swapping *Ideas* With Europe

We're borrowing European design for our cars and Europe is switching to American practice.

"YES, sure, I've got time to talk about the automobile business—always have. Chief trouble I have is getting somebody to listen. That's why I like to see you. You listen.

"Now what's the daily thought this time? You perform the Socrates stuff and propound your questions and I'll play Glaucon, Thrasymachus, and all the other fellows who tried to answer the trick questions without getting tripped up.

"Don't ask me any more about body trends, though. I told you all I had on my mind along that line a few weeks ago. Some of it sounded a bit futuristic to me when I saw it in print, but after all . . . oh, current European influence or American design, that's what's on your mind . . . well, you certainly struck me at the right time.

"I've been reading all about the new American models this year being built along European lines. I'm not entirely just sure what 'European design' is but there is one thing that has interested me very much in recent months.

"The American manufacturers seem to be busy trying to develop small cars in order to get the export market away from the foreigners, while, according to French and British correspondents, the manufacturers in those countries are planning to build bigger and more powerful cars to get the export market away from us.

"Take for instance the statement made recently by this chap Bradley who writes for you. I clipped it out . . . where is that . . . oh, here it is. Remember this: 'An exceptional revival of interest in the six cylinder engine will be a feature of the next Paris automobile show. Under the influence of American competition, European makers apparently feel that they have to provide a greater degree of flexibility and better top gear performances than they have given in the past.'

"Then I read about some Australian authorities who have been berating the British makers for not providing them with powerful cars such as the Americans build. And only a few weeks ago, Edmund Dangerfield had a long editorial in the British *Motor* in which he pointed out that British makers are going to have trouble in the export market so long as they build cars designed chiefly for British operating conditions. Dangerfield urges British makers to be alive to progress abroad. He points out that the British were late in taking up four-wheel braking, that they lag behind in adopting such refinements as oil and air cleaners, that symmetry of chassis layout hasn't been studied with the attention it has received on the continent, that British suspension systems, generally speaking, while more or less suitable for the magnificent highways of Great Britain, leave something to be desired for the conditions of other countries and that it is time the British paid greater attention to appearance.

"I've been watching this question in some of the foreign papers for quite a while back—I get a lot of them to keep in touch with body trends, you know—and about the only people over there who seem to be lauding foreign stuff particularly in comparison with American are those who aren't exactly familiar with what's really going on over here. One chap in the London *Daily Mirror*, for example, got all excited about two months back over the fact that American designers are said to be working on small cars, speaks of 'pocket-size autos' and concludes that 'The greatest motoring country in the world has learned its lesson—from England.' But it seems to me that he's off on the wrong foot. New American small cars may have a number of features of European light car practice, to be sure, but fundamentally they all are likely to be such an Americanized version of the European light car that they can be said to be very much more of American than European design.

"The whole thing looks to me as though the Europeans were busy getting ready to imitate us, while we are busy getting ready to imitate them. There probably is a good export market for a light car in many foreign markets, but the high-powered, sturdy sort of vehicle which has been characteristic of American design for many years is going to continue to sell well in overseas areas for a long while.

"Personally, I can't get too much excited about this European design influence on American cars. Improvements are improvements, wherever they originate, and if recent years are indicative, just as many if not more advances are going to be recorded on this side of the water than on the other. For sales purposes, of course, there might . . . Got to run off? . . . All right . . . glad to have seen you, and drop in again when you're around this way. I build bodies for a living and settle the problems of the automobile industry as a hobby—and it's always fun to ride a hobby."

EDITORIAL

Replacing Scrapped Cars

A VERY good idea of the immense importance of the replacement market for motor vehicles is given by the fact that present available data indicates the entire production for the first six months of 1926 amounts to only about 188,000 more vehicles than the number taken out of service during 1925, while total sales for the first six months lack some 250,000 of the number scrapped last year.

This last item does not mean, of course, that the vehicles scrapped last year have not been replaced, for many of the replacement sales were made during 1925. The fact remains, however, that the replacement market is becoming so large that already six months' production—and of the largest production period—is required to make up the deficit caused by scrapping.

Apparently, slightly over two million cars and trucks were taken out of service last year—about 1,800,000 cars and 300,000 trucks. These figures were computed by comparing total sales for the first six months of this year with registration figures for June 30, 1926, and December 31, 1925, as published in *Automotive Industries*. The 1925 registrations plus six months' sales are about 2,100,000 higher than mid-year registrations, indicating that this number of vehicles registered during 1925 have not been registered this year and so have, in all probability, been relegated to the scrap heap.

This number is considerably higher than the estimates given in *Automotive Industries* of April 29, 1926. The discrepancy is probably caused, in large measure, by the fact that the estimate was based on a mathematical study which did not take present conditions into consideration. The most important factor in the present situation is the popularity of closed cars. Apparently nearly every car owner wants a closed car but open models still make up over half of the total motor vehicle population. The strong influence which this condition has upon the life of open models is obvious and probably is an important factor in increasing the number of scrapped vehicles from some 800,000 in 1923 to 2,000,000 in 1925.

Use of Speed Governors

AN intimation is contained in an order recently issued by Samuel McGowan, chief highway commissioner of South Carolina, that passenger cars in that State may be compelled to equip with speed governors should an experiment just begun compelling buses to use such devices prove successful. The bus order requires governors on these vehicles which will make impossible a speed of more than 35 m.p.h.

The installation of any such ruling as related to passenger cars simply would be another limitation placed upon the efficient use of the motor vehicle, similar to those already imposed by impossibly low speed limits in certain areas. If the speed permitted by governors should be high enough to permit maximum safe speeds on the open road, no new result would be achieved by their installation. Should the speed permitted be low enough to insure safety under all operating conditions, the efficient use of the vehicle on the open road would have to be very severely handicapped.

It is hardly possible that any such suggestion could be looked upon with favor either by the motoring public—which comprises a vast majority of the population of the country—or by the automotive industry in general. Maximum speeds are only one small factor in the safety problem.

Protecting the Pedestrian

ACCORDING to E. S. Jordan, the practice of building sidewalks which stop at the street intersections might have been all right in 1890 but, with present traffic conditions, it is about as suitable as hour-glass figures and leg-of-mutton sleeves. In his report as a member of the N. A. C. C. Traffic Planning and Safety Committee, Mr. Jordan emphasizes the fact that if the man on foot can be protected two-thirds of the motor accidents will be eliminated.

Sidewalks have been considered necessary safety measures for years but he can not understand why crosswalks, which are of still more importance, have not been adopted. Primitive means have been employed in many cities by painting white lines along the foot crossings, but this, while better than nothing, certainly does not furnish adequate protection from careless or reckless motorists. Overpasses or underpasses for pedestrians are bound to come, in Mr. Jordan's opinion, and the longer they are postponed the greater will become the toll of lives from motor accidents.

Inasmuch as all available data indicate that a very large proportion of motor accidents arise from the collision of a vehicle with a pedestrian, it is surprising that more attention has not been paid to the elimination of such happenings. The fact is, however, that, with very few exceptions, traffic regulations have been developed for the sole purpose of expediting vehicular traffic and preventing collisions between vehicles while the poor pedestrian has been required to take his life—or a limb or two at least—in his hands every time he ventures to cross the street.

AUTOMOTIVE NEWS SECTION INDUSTRIES

Philadelphia, Pennsylvania

Thursday, September 9, 1926

Factory Output Increased to Meet Heavy Retail Sale

PHILADELPHIA, Sept. 9—Practically all leading automobile manufacturing companies have resumed capacity operation and several months of heavy production schedules are assured. Orders now on the books of many companies call for all the cars that can be produced during this period. Preliminary estimates of the August total indicate that it will show a considerable increase over July, and September will show further increase.

The retail situation is well in keeping with the prospective large manufacturing operations. Dealers handling many lines are taking orders subject to several weeks delay in deliveries. Throughout the country there is a condition of retail shortage so far as new cars are concerned, and used car stocks are normal in quantity and are moving at reasonably good pace.

Exports from United States factories showed a substantial increase in July over June, a gain, however, that suffered somewhat through reduction in Canadian exports. For the two countries, the export gain for the month was 9 per cent. Continuing large demand from export countries forecasts good business through the present quarter.

Merchandising plans of car manufacturers for the remainder of the year and for next year call for larger expenditures than ever before. The generally prosperous condition of the country is regarded as promising a steadily widening automobile market if it is expertly developed. To this end dealer organizations are being carefully coached and advertising appropriations are being steadily increased.

Nash 8 Months Business Passes Total for 1925

KENOSHA, Sept. 9—Nash sales and production for the first eight months of this year already have exceeded by a considerable amount the sales and production for the entire year of 1925, according to E. H. McCarty, general sales manager of the Nash Motors Co.

"All of the Nash plants," Mr. McCarty declared, "are now in large production on the recently announced new models, and estimates indicate September Nash sales and production will break all past records for September business At the time of our model announcement, stocks in dealers' hands were at low point."

Flint Votes Sewer Fund

FLINT, Sept. 9—Flint tax payers have voted overwhelmingly to raise $200,000 for sewer construction to serve the Flint Motor Co. plants recently acquired by General Motors Corp. Work of developing the factories as units of the Fisher Body division of the corporation will be rushed.

August Production Exceeds 400,000 Mark

Output by N.A.C.C. Members for First Eight Months Shows 442,120 Gain

NEW YORK, Sept. 9.—Continuing heavy factory activity is reflected in the car and truck production estimate for August made today by the National Automobile Chamber of Commerce based on reports received from its members in the United States and Canada. The Chamber announced the total production of its membership was 266,349 cars and trucks.

This figure is 22 per cent in excess of N. A. C. C. July production of 218,566 units and slightly more than 12 per cent above the August (1925) market of 227,371. A comparison also reveals that August was approximately 11 per cent under the peak production months of March and April, this year.

Production of N. A. C. C. members for the eight months of 1926 was 2,069,671 cars and trucks as against 1,627,551 units for the same period last year, an increase of 442,120.

Estimating Ford's August production at 154,000 units, the total car and truck production of the United States and Canada for August, 1926, would approximate 420,000.

Durant Sees New Values Rising from Trade Growth

NEW YORK, Sept. 9—A cable dispatch from London quotes W. C. Durant as expecting one of the greatest bull markets the United States has known. In the interview he is credited with voicing the opinion that the stock market at present quotations offers many bargains, and that "several of America's leading corporations have gained public confidence and good-will to such an extent that with continued efficient management and reasonably generous dividends, greatly increased values may consistently be expected for many years to come."

BUICK SETS RECORD OUTPUT IN AUGUST

FLINT, Sept. 3.—Every indication points to the necessity of keeping the Buick Motor Co. plant at peak production for months to come, to meet the demand for the new cars, according to Harry H. Bassett, president and general manager of the company.

During August, Buick built 29,355 motor cars which exceeds any other month in all of Buick's history. It exceeds by 15 per cent the previous high production mark set last March when 25,401 automobiles were produced. Compared with August of a year ago, when 19,729 cars were built, the increase represents 49 per cent.

Sales of Used Cars Gain in First Half

ST. LOUIS, Sept. 7—Used cars sold in the first half of 1926 showed a large increase over the total in the first half of 1925 according to statistics prepared by the National Automobile Dealers Association. Information used by the association was received from upwards of 1000 dealers in communities of varying sizes. Dealers in cities over 100,000 population were classified as A; 50,000 to 100,000 as B; 25,000 to 50,000 as C, and less than 25,000, as D.

Dealers in A cities sold 63,549 as against 59,318; B cities, 15,588 as against 13,452; C cities, 15,951 as against 11,245, and D cities, 34,720 as against 31,726. Used cars on hand were decreased slightly in A cities, and increased in C and D cities. Large reductions in stocks were made in B cities.

Average number of used cars on hand July 1, 1926 were 39.17, 14.56, 21.84 and 20.96 respectively, while average sold was 206.03, 144.44, 94.39 and 91.85. Average cost per car decreased in A and C cities but increased in B and D. Average sales prices per car were lower in A and C cities but higher in B and D.

Takes Dickinson Contract

WASHINGTON, Sept. 7—The Northwest Airways, Inc., of Detroit, will take over the operation of the Chicago-Twin Cities air mail route from Charles Dickinson on Oct. 1, Postmaster General New announces. Mr. Dickinson recently gave 45-day notice he wished to discontinue operation, and the Northwest Airways' bid was the only one presented on the date for opening proposals, Sept. 4. The new contractor will install new planes, but take over the present pilots.

Radio to Show Way for Planes at Night

Bureau of Standards Beacon to Eliminate Difficulties—U. S. Makes Strides

PHILADELPHIA, Sept. 7—"Radio is about to play an important part in the development of commercial air lines, especially with regard to flying by night, or flying through fog and thick clouds," said Dr. J. H. Dellinger, chief of the Radio Laboratory of the Bureau of Standards in his address here at the Commercial Aviation Dinner. "By means of a 'directive radio-beacon' developed by the Bureau of Standards, the pilot of a plane flying in fog or darkness is able to steer a correct course through keeping in constant touch with the ground. By this device," Dr. Dellinger said, "it is possible to correct the direction of the plane before it has varied from its course more than a few hundred feet. Other experiments are being conducted in which radio will tell the pilot when he is exactly over a landing field and also how many feet he is from the ground when his view is obscured."

More than 150 members and guests attending the "aviation" dinner sponsored by the Aero Club of Pennsylvania, American Society of Mechanical Engineers (aero division and local section) and the Engineers Club of Philadelphia, listened also to an address by Archibald Black, aeronautical engineer, who stated the United States leads the world today in commercial aviation development and said the most rapid progress in aeronautics has been achieved during the last two years. Statistics prepared by Mr. Black showed the number of miles and hours flown by American commercial airplanes and how they compared with the lower figures of the European air lines.

Two of the three newly appointed assistant secretaries for aviation made short addresses dealing with the governmental attitude toward aviation and how the commercial aircraft industry will benefit. These speakers were Edward P. Warner, assistant secretary of the Navy, and William P. MacCracken, assistant secretary of Commerce. Hollinshead N. Taylor acted as toastmaster. The banquet was held at the Bellevue-Stratford Hotel.

Truck Exhibits Will Aid Development, Says Horning

NEW YORK, Sept. 9—Plans for the truck exhibit at the national automobile show in New York are in keeping with the tremendous expansion during the last two years of passenger and freight transportation by motor, in the opinion of H. L. Horning, president of the Waukesha Motor Co. and president of the Motor & Accessory Manufacturers' Association. "Parts makers are greatly interested in the development," he said.

"Haulage of passengers and freight by motor," he said "has grown phenomenally in the last two years with the result that large numbers of the trade and the public only casually interested heretofore in motor trucks will welcome the opportunity to see and study the different makes at the show. With the addition of service equipment exhibits, we shall have thoroughly rounded-out national shows in 1927."

Commercial Aviation Outstripping Fields

PHILADELPHIA, Sept. 7—Municipally owned fields equipped with hangars, lighting and other facilities are essential to keep pace with the rapid strides now being made by commercial aviation, William P. MacCracken stated in his address before the National Aeronautic Association which is holding its annual convention from Sept. 6 to 11 at the Bellevue-Stratford Hotel.

With the development of numerous municipal air ports, air commerce can be brought directly to metropolitan centers while this movement will promote also further civilian interest which is highly desirous in time of war, the recently appointed Assistant Secretary of Commerce said. "Now is the time to buy land cheap" Mr. MacCracken continued, "and municipal air fields are vital to the growth and prosperity of any large city." As an example of the efforts being made by some of the mid-western cities, Mr. MacCracken stated St. Joseph, Mo., had built an airport covering 155 acres of ground at a cost of $250,000 and this municipal field is reputed to be one of the finest in the world.

Mitchell in Larger Plant

PHILADELPHIA, Sept. 9 — The Mitchell Specialty Co. has just moved to a new plant in Holmesburg, Pa., from its former quarters at Frankford. The new factory gives greatly expanded production capacity, having been acquired from the Electric Development & Equipment Corp., which built the works two years ago.

J. H. Mitchell, formerly general manager, is now president and general manager of the company, succeeding E. R. Mitchell. All the well-known lines of the Mitchell concern will be produced in the Holmesburg plant, but with the new production facilities an intensive program of development of the Electrolock has been launched. This is a coincidental lock.

Rawson Heads Elcar Sales

ELKHART, IND., Sept. 9—R. A. Rawson has been appointed sales manager of the Elcar Motor Co. Mr. Rawson has been connected with a number of leading automobile sales organizations in an executive capacity. At the time of his appointment he was vice-president and manager of the Stutz Indianapolis Co. Previously he was in charge of sales development work in the Stutz factory organization.

Business in Brief

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

NEW YORK, Sept. 9 — Security prices continued very strong last week, while the level of commodity prices at wholesale renewed the long decline which had been interrupted in the preceding week. Trade in general showed plainly the effects of buying for autumn requirements, although unfavorable weather continued to restrict the volume of business in some localities.

Sales of two leading mail-order houses last month amounted to $32,300,000, as compared with $32,000,000 in July and $28,800,000 in August last year.

PETROLEUM OUTPUT

Production of crude petroleum increased further during the week ended Aug. 28, averaging 2,176,850 bbl. daily, as against 2,170,500 bbl. in the preceding week and 2,116,350 bbl. in the corresponding period last year. Numerous reductions in prices of crude oil and gasoline occurred last week.

CAR LOADINGS

Car loadings in the week ended Aug. 21 numbered 1,088,791, as against 1,109,557 in the preceding week and 1,079,995 in the corresponding period last year. Net operating income of class 1 railroads in July totaled $116,895,311, representing an annual return of 5.62 per cent on their property investment, as compared with 4.90 per cent in July, 1925.

BUSINESS FAILURES

Business failures reported to Bradstreet's for the week ended Sept. 2 numbered 308, as against 347 in the preceding week and 283 in the corresponding period last year.

BANK DEBITS

Bank debits to individual accounts reported to the Federal Reserve Board for the week ended Sept. 1 were 1.6 per cent larger than the total for the preceding week and 3.9 per cent above that of a year ago.

FISHER'S INDEX

Fisher's index of wholesale commodity prices stood at 147.6 last week, as against 148.1 a week earlier and 147.7 four weeks earlier.

FEDERAL RESERVE STATEMENT

Bills and securities held by the Federal Reserve Banks increased $52,300,000 during the week ended Sept. 1, with a gain of $55,700,000 in discounts partially offset by declines of $1,100,000 in open market purchases and $2,300,000 in holdings of Government securities. Note circulation increased $10,300,000 and deposits $24,300,000, while reserves decreased $11,500,000. The reserve ratio declined from 75.4 to 74.4 per cent.

The call loan rate declined from 5 to 4½ per cent last week, while time loans for the longer periods were higher at 4⅞ to 5 per cent. Commercial paper rates were unchanged at 4¼ to 4¾ per cent.

Steel Backlog Seen Maintaining Values

Revised Base Price on Sheets Awaits Sales Test—Alloy Demand Improved

NEW YORK, Sept. 9.—While it is generally assumed in the steel market that tomorrow's publication by the leading interests of its unfilled tonnage on Aug. 31, will serve as a further prop for values, the attitude of consumers acts as a brake on the development of overconfidence. Revision of the base price for one-pass, cold-rolled black sheets to apply to No. 24 instead of, as heretofore, to No. 28 gage means an advance for the latter of $3 to $4 per ton. The independent producer who sponsored the announcement of this revision emphasized that it was made to adjust differentials to the actual differences in production costs.

So far the change can not be said to have fully weathered the acid test of representative sales on the revised gage basis. There is no question that the sheet market has gained strength, compared with the corresponding period of a month ago, especially full-finished automobile sheets, but so far little unanimity has been in evidence among producers when one or the other mill assayed an advance. In fact, it is quite generally understood that while the price for hot-rolled steel bars is 2c, the buyer of a heavy tonnage would experience little difficulty in shading that price by $1 or $2 a ton.

Automotive demand for alloy steels has improved somewhat. Strip steel mills are provided with fair-sized backlogs of automotive orders, and cold-finishers of bars are also in fairly comfortable position in this respect. On the whole, the steel market for the year's final quarter remains to be made, and, after the relatively heavy business booked during the year's normally dullest months, there is some uneasiness over the rate of demand that September will bring out.

Pig Iron—Somewhat better inquiry for pig iron from automotive foundries is reported by sales agencies. The $17.50 base price for No. 2 foundry, valley, continues in effect with scrap iron commanding a shade more than virgin metal. The coke market, looked upon by many as a barometer for conditions in the iron and steel market has strengthened.

Aluminum—The sole domestic producer again received in the last few weeks heavy shipments of ingot metal from Europe, especially from Germany. The Natural Resources Intelligence Service of the Dominion of Canada announces authoritatively that production at the new Saguenay River plant in Quebec will get under way this month. While rather easy in tone, the market remains pegged at old prices.

Copper—A good-sized tonnage of Lake copper is reported to have been contracted for by a Michigan brass manufacturer. The copper market is rather quiet, but prices are fairly well maintained.

Tin—The London bull contingent capitalized a slight decrease in the world's visible supply to the fullest extent, and consumers consider prevailing price levels altogether too high.

Lead—So far there is little evidence of storage battery consumers having covered their October requirements.

Zinc—Galvanizers have been buying more freely of late, but brass demand has been rather lagging. The market is steady.

Parts Makers Show Increased Earnings

CLEVELAND, Sept. 8—Net earnings of automobile parts manufacturers of the Fourth Federal Reserve District for the first six months of this year were $21,738,000 as against $18,918,000 one year ago, according to the Federal Reserve Bank's statement. Automobile plants earned $134,921,000 net as against $101,381,000 in the first six months of 1925.

Of the various industries canvassed by the Chamber of Commerce, the automobile industry led in the increase of working forces. Seventeen plants making automobile parts or accessories were employing 20,450 men at the end of August, the highest number employed since the chamber made its first survey in 1921.

The automotives gained 4.7 per cent in employment in August in addition to a 3 per cent gain in July.

Wages for common labor is now at its highest point since the inflation period of 1920. The average wage is 44.9 cents per hour. There are no longer any of these plants paying less than 39 cents per hour for common labor and two plants are paying 55 cents.

Truck manufacturers are forecasting the largest year's business on record.

N.S.P.A. Members Rush Requests for Show Space

DETROIT, Sept. 3—Over 60 per cent of the National Standard Parts Association members have filed their applications for show space, according to Executive Vice-President E. P. Chalfant, and already the problem has come up to provide space for the group of new members, who invariably apply for membership at the eleventh hour.

The first allotment of show spaces is scheduled for 10.30 a. m., Oct. 1, at the N. S. P. A. headquarters in Detroit. The show will be held Nov. 15-19.

"The drawing will be by name, irrespective of priority," said Mr. Chalfont. "Many members have signified their intention to be present at the drawing to make their space selections. A feature of the show will be the absence of an orchestra."

Flint Presents Paper

NEW YORK, Sept. 7—"Flint Sales Flashes," a new house organ, has just made its appearance with a foreword by Colin Campbell, vice-president of Durant Motors, Inc. The publication will appear twice a month. The company has in preparation two booklets, one covering Flint cars, for distribution to prospects, and the other for the use of salesmen.

American Brake Shoe Enters Motor Field

Will Manufacture New Brake Shoe and Braking Material for Industry

NEW YORK, Sept. 7—The American Brake Shoe & Foundry Co., for years a leading manufacturer of steam and electric railway equipment, has entered the automotive industry with the formation of a subsidiary, the American Brake Materials Corp. for the manufacture and sale of a new design of brake shoe and braking material for motor vehicles.

Joseph B. Terbell is chairman of the board of the American Brake Materials Corp.; Arthur Aigeltinger is president, and J. S. Thompson, vice-president. All three occupy similar positions with the American Brake Shoe & Foundry Co.

General offices will be at 30 Church St., New York, and manufacturing will be centralized at the plant at Lancaster, N. Y., of the American Malleables Co., another subsidiary of the Brake Shoe Company.

The new material is a hard pressed composition. With its use in connection with a special shoe it has been possible to cut down the braking surface from 2/3 to 4/5 as against the current types of brake lining, and with equal or better effectiveness and no appreciable deterioration under hard service, according to officials of the company. Development work has recently been completed after two years of study and experiment under Mr. Thompson's directions.

Tests of the material under operating conditions have developed exhaustive data regarding brake temperatures and friction, and this will shortly be made available to engineers of the industry.

Metal Emergency Tire Designed to Save Rim

KANSAS CITY, Sept. 4—The Economy Electric Co. of this city will soon go into production of a new emergency spare tire, to be made of wood and steel, according to announcement made here last week by J. E. Cauger, treasurer of the company. The tire has been devised as a protection to rims and wheels on which it has become necessary to drive temporarily without the usual pneumatic tire. It will be made to fit various types and sizes of automobile wheels.

To enable quantity production of this new item and as a means of increasing production of the company's other items, principally automotive electrical equipment, the Economy company will begin construction within 90 days of an addition to its present brick and steel plant.

The Economy Electric Co. was organized a little less than one year ago and purchased the present plant in November, 1925. Other officers of the company are: Scott Kennedy, president, and R. H. Dyer, vice-president and general manager.

August Production Reaches New Marks

Leading Companies Report Records Set for Month—G.M.C. Builds 138,000

DETROIT, Sept. 3.—With a majority of the big producing companies enjoying the greatest August business in their history, information gathered from automotive executives of various Michigan companies indicate excellent business will continue through September and the Fall months.

The fact that most of the companies have now introduced their new models has tended to stabilize the market which showed its natural seasonal decline in mid-summer and now the public is resuming the purchase of automobiles in increasing numbers.

Many dealers throughout the country have unusually small stocks of cars on hand while large numbers of them cannot obtain units from the manufacturers to supply their demand. Dealers report that a general prosperous condition throughout the United States augurs well for a continuance of excellent selling conditions.

General Motors Corp. has shown a remarkable increase in business. During August approximately 138,000 automobiles were produced by the various units of the corporation, a gain for the month of 76 per cent over a year ago. All units of the corporation are continuing to operate at capacity.

The Chrysler Corp. is another manufacturer operating at peak capacity. The corporation enjoyed an excellent business in August, and, it is understood, entered September with a large volume of unfilled orders. The new "50" has met with an unusual reception and orders continue to pile up at the factory.

Roy D. Chapin, chairman of the board of directors, Hudson Motor Car Co., reports his concern enjoyed the greatest August in its history, shipping 28,700 cars. This exceeds by more than a thousand the fine showing made by Hudson-Essex in August a year ago. During June, July and August the company produced more than 70,000 automobiles.

Dealers Have Small Stocks

Dodge Brothers, Inc., which has exceeded its former production records with regularity, this year, continues to do so with the factory operating at capacity. Dodge Brothers dealers are understood to have small stocks on hand.

Since the introduction of the new Packard models, the Packard Motor Car Co. has been operating at capacity in an effort to fill dealer demands. The company reports many dealers have more orders than the factory can immediately fill.

The Reo Motor Car Co., at Lansing, is another manufacturer operating at capacity. During the first two weeks of August the Reo plant was closed for the annual vacation period during which slight changes were made in passenger car models. Since reopening, however, demand for the cars has been heavy and the plant is operating at capacity. Every indication points to a promising business for September.

Harry M. Jewett, president, Paige-Detroit Motor Car Co., which has just announced a new line of Jewetts, predicts his company will enjoy the best last quarter it has known in years.

Chevrolet Advances Production Program

DETROIT, Sept. 4.—Work is being rushed on the Chevrolet Motor Co.'s $10,000,000 expansion program to make possible an increase for 1927 of 1000 cars a day.

At Flint, an addition to the huge motor plant is well under way. New equipment for making camshafts, small parts and cylinders is already arriving and is being installed. The sheet metal division at Flint is also being greatly enlarged.

The transmission plant at Toledo will be augmented by a building 206 feet x 134 feet which is now under construction. Additional facilities for the heat treating department at Bay City is being made possible by plant enlargements there.

The Chevrolet Motor Co. has purchased the General Motors Truck Co. plant No. 7, in Detroit, and will utilize it for the manufacture of axles and small parts. It will be merged with the gear and axle plant.

Extensive enlargement programs for the Chevrolet factories in Cincinnati, Janesville and St. Louis are also under way. The Fisher Body Corp. is also enlarging its facilities in these cities to provide an annual production of 750,000 closed bodies and 250,000 open bodies.

Equipment Makers Merge

JACKSON, Sept. 7—National Machine & Tool Co. of this city and J. H. Whetstone Co., Lapeer, both manufacturers of garage equipment, have merged, the first company taking over the equipment and right to the manufacture of the Hovey jack line and also the Creeper line, both formerly manufactured by the Whetstone company.

No changes are expected to be made in the sales personnel but it is expected to augment the present organization. The main office and factory will be continued in Jackson with export offices in New York.

To Exhibit at Convention

WASHINGTON, Sept. 4—Nine truck and body companies will exhibit during the Buffalo convention of the American Bottlers of Carbonated Beverages, Nov. 8 to 12. These include White Motor Co., Republic Motor Truck Co., Inc., International Harvester Co., General Motors Truck Co., Highland Body Mfg. Co., Graham Brothers, Federal Motor Truck Co. and Cleveland Pneumatic Tool Co.

New Haven to Try N. Y. Truck Delivery

Will Supplant Barge Service in New York With Trucks if Successful

NEW YORK, Sept. 3—The New York, New Haven & Hartford Railroad Co. is experimenting with a plan designed to replace its car float service in New York from the Harlem River terminal at 133rd street to the six East River piers north of the Brooklyn Bridge, with through motor truck delivery from Harlem to the stores and warehouses of consignees in Manhattan.

The railroad has taken the first step in launching this plan by filing a new tariff, which the Interstate Commerce Commission has approved. Under this tariff the carrier establishes through rates to a theoretical freight delivery station at 59th street, assuming the cost of cartage to that point. There is no actual delivery station there but under the plan the consignee assumes the cost of cartage from 59th street to the point of delivery.

The New Haven has already signed a contract with the United States Trucking Corp. for the operation of a cartage service applying to certain goods reaching the Harlem terminal in carload lots. Despite this contract, it is understood no carter is to be allowed an exclusive right to the delivery business when the business has broadened out to supply all classes of freight.

Under the old system, freight was carried on car floats to the piers and the entire cost of truckage was absorbed by the consignee. There is no immediate intention of abandoning the pier service, as the railroad wishes to give the new plan a thorough tryout. It is pointed out that the theoretical 59th street delivery point is much nearer the actual center of Manhattan through deliveries than the East River piers.

New Terminal Coordinates Water-Rail-Truck Lines

OAKLAND, CALIF., Sept. 8—Construction has started on the first unit of the terminal being constructed on the waterfront here for the Drayage Service Corp. of which Proctor Scott is president. The first unit will be ready for use before Oct. 15, this year.

The structure is a land-water, rail-steamer, terminal and warehouse, especially designed for the use of motor trucks and co-ordination of motor truck, rail and water-borne traffic. It is one story in height, class C, all brick and steel, with no woodwork. Rolling steel doors, outside and between sections inside, assist in reducing fire hazard. All window frames, door casings and similar furnishings are of steel. Walls are of brick, with steel trusses and columns. Four other units are to follow, total cost of the completed plant being $500,000. The first unit is 412 by 127 feet.

Chrysler is Upheld on Insurance Plan

Court Holds Dealers Not Insurance Agents in Sale of Insured Product

WASHINGTON, Sept. 8—A ruling against the State of New York, in its attempt to classify as insurance agents, automobile dealers who sell Chrysler cars which had been insured in Michigan and for which the premium was collected as part of the sale charge, has been given by the District Court of the Southern District of New York, a report of the decision to the Department of Justice states.

James A. Beha, state insurance superintendent, had held that the Palmetto Fire Insurance Co., of Michigan, was doing business without a license in New York state, in that automobile dealers sold the insurance company's policy with Chrysler cars. Arrangement for the insurance had been made by the Chrysler Corp., in Michigan.

The insurance company took the matter to court. The decision held that it would be going too far "to say that the retailer is the agent of a company which neither directs nor pays him, nor has anything to do with him . . . ." An agreement made in Michigan between the Chrysler Corp. and the plaintiff does not involve an effecting or procuring of insurance in the state of New York.

Chapin Asserts Nation Never More Prosperous

DETROIT, Sept. 3.—The Hudson Motor Car Co., during August, shipped 28,700 cars, or more than a thousand in excess of August a year ago, according to Roy D. Chapin, chairman of the board of directors. During June, July and August, Hudson and Essex production exceeded 70,000 units.

Mr. Chapin expressed the opinion that business will continue good. "The reports we have is that the nation is probably more soundly prosperous than ever before in its history," he said. "Except for comparatively isolated districts, crops are fine, general business active, and employment at good wages all but universal. In a country as large as the United States, there are bound to be exceptions, but as a whole this autumn is proving far better in a business way than had been expected by all but the most optimistic."

Howe to Make Piston Ring

WELLSBORO, PA., Sept. 8—What is known as the Howe Packing Co. has been organized here with Fred Howe, president; John Callahan, vice-president; I. J. Focht, secretary and Dr. H. W. Bailey, treasurer. The purpose of the organization will be to market the Howe packing ring and to supervise its manufacture. The Howe ring is made of metal alloy, slightly V shaped, with tongues along one edge. It fits behind the ordinary type of cast iron piston ring.

HOOVER WOULD HAVE ROADS PROTECT LIFE

WASHINGTON, Sept. 8—Secretary of Commerce Herbert Hoover has been invited to take part in traffic conferences to be held at the 1927 convention of the American Road Builders' Association, which is expected to draw 40,000 highway engineers, contractors and roads officials to Chicago during Good Roads Week next January.

Uniform traffic laws by the various states and construction of highways with the view to protection of human life rather than simply as a temporary method of transportation, are urged by Secretary Hoover, in a statement just issued through the American Road-Builders' Association.

Oregon July Sales Show Large Gains Over June

SAN FRANCISCO, Sept. 8—Members of the Motor Car Dealers' Association of San Francisco have received advices that dealers in Oregon nearly trebled their business in July. Total sales of 5270 new cars and trucks are reported from that state for July, as compared with 1876 for June, this year. Comparison with July, 1925, sales, an increase of 42 per cent is shown.

Ten leading makes sold 84 per cent, or 4421 automobiles, of the July, 1926 total, as follows: Ford, 1808; Chevrolet, 814; Dodge, 438; Star, 318; Buick, 281; Chrysler, 191; Overland, 183; Studebaker, 140; Oakland, 115; Pontiac, 113.

Motor registration for the first six months of 1926 in Oregon was 197,326. For the same period last year, it was 181,620, gain of 15,706.

New Seattle-Los Angeles Air Mail Route Ready

WASHINGTON, Sept. 8—The first contract air mail route calling for night flying will be inaugurated between Seattle and Los Angeles, 1099 air miles, on Sept. 15, Postmaster General New has announced. The Pacific Air Transport Co., the contractor, has installed beacons similar to those on the transcontinental route. Eight planes will be used by the contractor, who is to receive $2.81 per pound for 1000 miles and under, and $3.09 per pound for over 1000 miles. The postage rate between Seattle and Los Angeles will be 15 cents and 10 cents for points in between.

Bus to Join Coast Cities

SAN FRANCISCO, Sept. 8—Motor bus service for passengers and light luggage is to be established between San Francisco and Seattle, Wash., according to an application filed with the Department of Public Works of the State of Washington, Aug. 28. L. V. Norman, of Seattle, made the application asking for an interstate certificate to cover the route.

Pettit Acquisition Fortifies Nash Staff

No Change in Responsibilities of Present Officers — Increase Plant Capacities

MILWAUKEE, Sept. 4—Concerning the appointment of M. H. Pettit as vice-president and assistant general manager of the Nash Motors Co., C. W. Nash, president, made the following statement:

"The addition of Mr. Pettit to the executive force of the company in no way changes the responsibility of the present executives, but will help relieve their present heavy burden. The very substantial development of the Nash Motors Co., and the prospect of continued opportunity for further sound growth, have brought to the executive management of the company increasing responsibility, and it is the policy of the management to maintain executive strength in proportion to the company's needs."

Mr. Nash, who underwent an operation for appendicitis early in June, returned Aug. 27 from a lengthy recreational stay at his camp in northern Wisconsin, completely recovered. Following an executive conference, it was announced that large orders for new equipment for the Racine plant have been placed, to increase the capacity for production of the Nash Light Six, from 200 a day to 250 and later to 300. About 2500 are employed at Racine at present.

Plans for adding to the equipment at Kenosha, where the Advanced Six is made, and at Milwaukee, where the Special Six is produced, are now in the stage of final consideration, it was announced. The additional capacity is to be ready to meet the spring demand for Nash cars.

British Tire Imports Rise

WASHINGTON, Sept. 8—British imports of tires and tubes showed a distinct advance in aggregate value during the first six months of 1926, as compared with 1925, the American Consulate-General at London reports to the Department of Commerce. Value of casings imported rose £444,669, or more than 27½ per cent, while inner tubes advanced £150,650, or 73½ per cent. The value of solid tires imported, however, was somewhat lower.

Canadian Road Meeting Set

WASHINGTON, Sept. 8—The thirteenth annual convention of the Canadian Good Roads Association will be held Sept. 28 to 30, Assistant Trade Commissioner W. J. Donnelly, at Montreal, reports to the Department of Commerce.

Altoona Race Sept. 18

ALTOONA, PA., Sept. 8—Unfavorable weather conditions, which made it impossible to hold the qualifying trials, caused the postponement of the annual Labor Day automobile race at the Altoona Speedway to Saturday, Sept. 18.

July Exports Gain 9 Per Cent on June

Increased Shipments From United States Offset Somewhat by Canadian Loss

WASHINGTON, Sept. 8—Automobile exports during July, 1926, showed a gain of 9 per cent over the preceding month, revised figures issued by the Automotive Division, Department of Commerce, show.

During July, 1926, there were 17,077 passenger cars exported, as against 15,354 in June; and 5409 trucks, against 4580 in the preceding month. Canadian shipments, however, decreased in July as compared with June, the figures being 4158 against 4531. Considering United States and Canadian shipments in the aggregate, the increase of 9 per cent leads the Automotive Division to make the prediction that "automotive shipments for the whole of 1926 will surpass even those of the record year which preceded it."

The strength of the export market is indicated by the fact that, despite the increase in shipments abroad from the United States, production here declined in July as against June, there being 27,198 fewer automobiles produced than during June, and 33,555 less than during July, 1925. Production decline is said to be due to some extent to model changes now being made.

Truck Test-Run on Coast May Extend Radius of Use

SAN FRANCISCO, Sept. 8.—Smashing truck records became popular in the West the last week in August, a month marked by unusually large sales in these vehicles. A Moreland, six-ton, six-wheeled, dual-axle-drive truck was driven from Los Angeles to Salt Lake, the last week in August. The 826 measured miles were covered in 35 hours, 37 minutes, an average of 23.16 miles an hour. This is an excellent record, considering that more than 75 per cent of the distance is in mountainous country, with frequent steep grades. This truck trip indicates that the radius of successful use of these vehicles may be extended considerably beyond the 200 miles to which the majority of them are limited in western hauling.

Hold Public Aero Meeting

CLEVELAND, Sept. 8—In order that the public may be educated in the utility of the airplane, the Aero Club of Cleveland held an open meeting to which the public was invited. Earl F. Ward, air mail pilot, and Willard Parker, president of the club spoke.

Adopt Uniform Traffic Law

SAN FRANCISCO, Sept. 8—Nine municipalities in southern California have adopted the uniform traffic ordinance drafted by the California State Automobile Association. A special committee of the California League of Municipalities is now studying the ordinance, with a view to recommending its adoption by all California cities. This ordinance was approved by the California Public Safety Conference and supported by the county associations of supervisors throughout the state. The California Peace Officers' Association and the California Association of Highway Patrolmen will take up the ordinance at their conventions this year. Adoption throughout the state will give all California cities a uniform traffic code.

Would Cut License Twelfth Each Month

SAN FRANCISCO, Sept. 7—An unusual method of collecting automobile license fees has been recommended by the Automobile Dealers' Association of Coos and Curry counties, Oregon, according to advices received by the San Francisco Motor Car Dealers' Association. It is proposed that the license fee be divided into twelfths, so that the purchaser of a car will have to pay only for that part of a year after purchase. The two-county association drafted and adopted a resolution to this effect, and sent copies to other dealer associations up and down the coast.

The resolution reads:

"WHEREAS, the inequable method of reducing the license fee only at the expiration of six and nine months is having a detrimental effect on the business of selling automobiles by reason of the fact that many prospective purchasers will not buy an automobile in the months of May, June, September and December, but withhold purchase until July, October or January, because of the reduction of license fee in those months;

"THEREFORE, be it resolved that we, the members of the Automobile Dealers' Association of Coos and Curry counties, believe that paragraph 1, section 25, chapter 331, Oregon Laws of 1925, should be amended to read as follows:

" 'Provided, that for the registration of any car sold or purchased on or after February of any year, the fee shall be reduced one-twelfth each month.' "

The idea was favorably received by the San Francisco association.

Truck Operator Leases Pier

OAKLAND, CALIF., Sept. 8—The Lawrence Warehouse Co., one of the largest operators of motor trucks on the coast, and closely connected with a motor-tug and barge service on San Francisco Bay, has been given a lease on the entire Market Street Pier, Oakland. Larger warehouses, wharf sheds and truck garage are to be constructed on the pier. The company will have triple transportation terminals—rail, truck and barge—and also will berth deep-sea steamers at this terminal.

G. M. of Canada to Convene

DETROIT, Sept. 4.—General Motors of Canada, Ltd., will hold its annual parts and service convention at the factory in Oshawa, Sept. 13 to 15.

Find Many Engines Uneconomical on Fuel

President Advised by Oil Board That Design Could Overcome Losses

WASHINGTON, Sept. 8—Estimates that 25 per cent of the gasoline now used by gasoline engines could be saved and the same mileage of movement provided, if there were more adequate designs of carburetors and engines, are made in the first preliminary report of the Federal Oil Conservation Board forwarded to President Coolidge at the summer White House by Secretary of the Interior Hubert Work this week.

"It is certain that many of the gasoline engines are inadequately designed to secure the most economic use of gasoline," the report states in its summary of conservation measures. The fact that automotive manufacturers have been improving the gasoline consumption factors of their engines for many years is pointed out, and it is predicted that "their improvement will be expedited if there should be a tendency of the gasoline prices to rise."

Two additional reports, one of them dealing with possible substitutes, are later to be issued by the Board, the report states.

The other principal features of the preliminary report, which is signed by Secretaries Work, Hoover and Dwight F. Davis, can be summarized as follows: 1. The total reserve in pumping and flowing wells in proven sands is now only 4,500,000,000 barrels, less than six years theoretical supply, although it could not be extracted that fast. 2. Extension of the cracking process, which now accounts for only 31 per cent of our gasoline, to at least 80 per cent of production. 3. Consideration of the possibility "that future discoveries may reduce, or entirely eliminate the need for petroleum fuels in the national defense and that substitutes for mineral lubricants may be developed on a scale sufficient to meet major requirements." 4. Recommendation that American capital acquire foreign oil fields, particularly in Mexico and South America, so that this country would not have to depend on foreigners for its supply, in which connection attention is called to foreign control of rubber, potash, etc.

The report recommends complete co-operation within the oil industry, as well as co-operation between the industry, the various States and Federal Government.

AC Publishes News

FLINT, Sept. 3.—The first issue of a new house organ, "The AC News," has just been published by the AC Spark Plug Co. and is being sent to dealers throughout the United States.

Articles of current interest and information about AC products will feature each of the issues, according to the policy adopted for the publication by the company.

Men of the Industry and What They Are Doing

General Motors Export Names Australian Heads

Managers of the new Australian operations and the territories over which they have control have been announced by General Motors Export Co. Each of the new branches will operate as a distinct unit under the direction of Innes Randolph, managing director of General Motors (Australia) Pty. Ltd., who is also regional director for Australia.

J. T. Potter will be manager in New South Wales with headquarters at Sidney; C. C. Williams, manager in Queensland, with headquarters at Brisbane; M. P. Nolan, manager in South Australia, with headquarters at Adelaide; W. D. Hopson, manager in West Australia, with headquarters at Perth, and D. Bardin, manager in Victoria and Tasmania, with headquarters at Melbourne.

E. E. Kaiser has been made managing director of General Motors Peninsular, with headquarters at Madrid. G. P. McGuire has been named export sales manager of Vauxhall, with headquarters at London. E. C. Daum has been made assistant advertising manager, succeeding J. E. Weik. Louis de la Garde has been appointed assistant to the general sales manager at New York.

P. C. Gunion, manager of the advertising division, is on special assignment with Vauxhall Motors Ltd., in London, and will return to the New York office about Oct. 15. W. B. Boyce is on a special assignment in Peru.

McGeorge in Cleveland

John McGeorge has been given charge of the oven and conveying department of the McGann-Harrison Corp., Cleveland, removing to that city from Detroit where he had been associated with the Jarvis B. Webb Co., conveyor engineers. Formerly he had been connected with the Oakland Motor Car Co. as plant engineer.

Graybar Honors Cullinan

George E. Cullinan, vice-president in charge of merchandising and sales of the Graybar Electric Co. has been presented with the gold and blue service medal of his company emblematic of 25 years of service with the Western Electric and Graybar Electric companies.

Earle Heads Fuller Sales

John H. Earle, for several years eastern sales manager of Fuller & Sons Mfg. Co., Kalamazoo, has been placed in charge of national sales and advertising and transferred from Reading, Pa., his former headquarters, to the factory.

Bowler Republic Manager

Republic Motor Truck Co., Inc., has opened a direct factory branch at Philadelphia with C. L. Bowler, well-known in automotive circles in Philadelphia, as branch manager.

SHALER WILL GIVE STATUE TO WAUPUN

Clarence A Shaler, president of the C. A. Shaler Co., will give "The End of the Trail," a magnificent statue by James Earle Fraser, to the city of Waupun, it is announced. The original figure, modeled in plaster, was exhibited at the Panama-Pacific Exposition in San Francisco and made its creator internationally famous. The statue will not be completed until next summer.

The first work of art brought to Waupun by Mr. Shaler was Lorado Taft's statue, "The Angel of Peace."

Dr. Marks Named Secretary

Lewis Hart Marks, M. D., has been appointed executive secretary in charge of the offices of the Industrial Alcohol Manufacturers Association, New York. In addition to directing all regular association business, Dr. Marks will be in charge of all joint experiments for the benefit of member firms. The association also has appointed J. H. Newmark, Inc., New York, as director of its advertising.

Marmon Names Sales Heads

S. A. Zweibel and H. W. D. Brown have been appointed district sales managers for Marmon Motor Car Co., the former taking charge of sales in the midwest zone and the latter in the central-southern district. Expansion of Marmon business during the past two years has made the creation of the new sales districts advisable, said H. H. Brooks, general sales director.

Mason Buys Star Branch

Arthur Mason, nationally-known engineer, has purchased the Santa Barbara branch of the Star Motor Co. of California. Price and other details have not been made public, but the branch here is known to have been one of the most successful of the small branches in California.

Murray in Buffalo Office

Durant Motors, Inc., has opened a new wholesale office in Buffalo, in charge of G. C. Murray, formerly traveling representative of the company in western New York. This office will direct the wholesale business in Star and Flint cars in western New York and northwestern Pennsylvania.

Hazen Joins Brubaker

Deane S. Hazen has been appointed assistant sales manager of W. L. Brubaker & Bros. Co., New York. He was recently a management consultant at Springfield, Mass., and previously had been associated with the National Acme Co. of Cleveland.

Blythe Vice-President of California Goodyear

Harry E. Blythe, general superintendent of the Goodyear Tire & Rubber Co., of California, has been elected to the vice-presidency to succeed A. F. Osterloh, who resigned to become president of the Industrial Foundation of America, a $12,000,000 finance corporation fostered by the Los Angeles Chamber of Commerce.

Mr. Osterloh had been connected with the Goodyear organization since 1902. In his later work with the California company he became associated closely with the Los Angeles chamber of commerce and its development work, which led to his selection as head of the new finance corporation.

J. K. Hough has been appointed sales manager of the Goodyear Tire & Rubber Co. of California.

Metropolitan S. A. E. Dance

The Metropolitan Section of the Society of Automotive Engineers is issuing invitations for a frolic to be held at the Manhasset Bay Yacht Club, Sept. 15.

The members and guests will leave for the Yacht Club in buses, have dinner and then dance on the clubhouse veranda to the music of the Silvertown Cord Orchestra.

On the frolic committee are: J. M. Grant, L. E. Vogt, S. H. Woods, W. J. Sommers, S. R. Milburn, W. E. Kemp and G. A. Round.

Wissing Named Representative

Fred E. Wissing, who for the last 16 years has been associated with the Waterhouse & Lester Co., in San Francisco, has been named Pacific Coast representative of several eastern manufacturers, including the Cincinnati Electrical Tool Co., Jessop Steel Co., National Screw & Mfg. Co., St. Mary's Wheel & Spoke Co., and the Cotesville Plate & Washer Co. He has opened headquarters at No. 1, Drumm Street.

Whitmore G. M. Truck Manager

S. L. Whitmore, of Greensboro, N. C., formerly a wholesale representative of the Charlotte branch of the General Motors Truck Corp., has assumed the duties of manager of the Charlotte branch, succeeding L. D. Stapleton, well-known figure in this state's automotive trade, who was promoted to be manager of the company's branch at Atlanta.

Boosters to Dine Board

A banquet complimenting the incoming international board of governors of Automotive Booster Clubs will be given by the Chicago Chapter No. 7, Nov. 7 at the Congress hotel. This is an annual event. Bert G. Cochrane, secretary of the Chicago chapter, announces that all boosters and their friends are invited to attend the banquet.

Development Urged of Coal Fuel Source

NEW YORK, Sept. 8—Necessity for the United States preparing against the exhaustion of the petroleum supply through development of processes of extracting automotive fuel from coal is sounded by A. C. Fieldner, head of the Pittsburgh Experimental Station of the United States Bureau of Mines.

The development of such processes in England and other European nations is attributed by Mr. Fieldner to military and naval necessity, in addition to providing a solution for England's coal mining labor surplus, but he said, future conditions in this country justify experimental work now because of the years required to develop such processes.

"There is not a total lack of preparation," he said, "a by-product of coal constituting a part of the motor fuels, but it does not amount to much compared to the total amount of gasoline used."

Knudsen Sees No Trade for European Car Here

DETROIT, Sept. 4.—The European small car is not destined to figure prominently in the American market because of the limitations of this type of car, W. S. Knudsen, president of the Chevrolet Motor Co., declared in an interview during the recent Chevrolet convention, held in Detroit.

"Not one of the European cars that comes under the head of 'small' would satisfy American requirements," declared the manufacturer. "Some of these machines have as many as four forward speeds and gear shifting is resorted to on the slightest hill.

"The American driver in many cases uses only second and high gears when his car has once warmed up. Power with him is one of the essentials—and that is not to be found in the small combustion engine designed for peculiarly European conditions. He dislikes a car with an engine that forces him to shift gears when the motor is required to exert power. No small car made in Europe compares favorably with American small types.

Warner Guest of Honor at Philadelphia Dinner

PHILADELPHIA, Sept. 4.—A testimonial dinner was given this week to E. P. Warner, the recently appointed assistant secretary of the Navy for Aviation, by a group of members of the Society of Automotive Engineers. The dinner was held at the Pennsylvania Athletic Club and was attended by about 150 friends of Mr. Warner. R. E. Wilson of the Standard Oil Co., of Indiana, was toastmaster, while A. K. Brumbaugh, of Autocar Co., taking the part of Father Neptune, presided at the rites of launching the new secretary into the Navy.

Other speakers were Coker F. Clarkson, general manager, S.A.E.; George W. Lewis, of the National Advisory Committee for Aeronautics, and Lester D. Gardner, president, Gardner Publishing Co.

Hanch to Address Dealers

CHICAGO, Sept. 4—C. C. Hanch, general manager of the National Association of Finance Companies, will address the Pennsylvania Automotive Association on automobile financing at the annual convention.

Financial Notes

Kelsey Wheel Co., Inc., reports profit of $670,281 for the six months ended June 30, after charges but before Federal taxes, equivalent after 7 per cent preferred requirements to $5.93 a share earned on the 100,000 shares of common stock. This compares with $884,755 or 8.04 a share on common in the first half of 1925. The balance sheet shows cash of $1,131,066 receivables of $1,553,129 and inventories of $3,250,443. Surplus is $9,204,539 and total assets $22,176,418. Net sales in the current half year were $8,178,141 as against $7,862,051 in the 1925 period.

Jordan Motor Car Co. omitted the quarterly common dividend of 75 cents a share, due at this time, but declared the regular quarterly dividend of 1¾ per cent on its preferred stock.

Says Bus Rule Favored

NEW YORK, Sept. 9—A. J. Brosseau, chairman of the special committee of the National Automobile Chamber of Commerce for participation in the Interstate Commerce Commission hearings, reported at the board of directors' meeting today that the consensus of testimony given at the hearings in various parts of the country favor some form of regulatory legislation for buses but that opinion is divided as to regulation of trucks because of the practical difficulties involved.

Reeves on Canadian Trip

NEW YORK, Sept. 9—Alfred Reeves, general manager of the National Automobile Chamber of Commerce, will visit a number of leading cities of Canada beginning Monday, Sept. 20.

Developments of the Week in Leading Motor Stocks

NEW YORK, Sept. 9—A sharp advance in General Motors stock was the outstanding feature of the trading during the past week in the motor shares. This advance carried other motor shares with it, giving the entire list a strong tone. Buying of General Motors was stimulated by reports of the Corporation's record business in August and prospects for large earnings in the third quarter of the year, which are expected to compare favorably with the records of the first two quarters.

Yellow Truck & Coach, which is controlled by General Motors, also advanced to new high levels accompanied by reports that steps are under way to merge this unit with the big company through an exchange of General Motors stock for the outstanding minority shares of Yellow Truck. While such a step will eventually be taken, usually well-informed interests state that it is not a matter of the immediate future. Speculative interests are optimistic over the prospects for Yellow Truck and with the additional capital which has been made available through the recent sale of a large block of stock at $20 a share, earnings are expected to increase rapidly.

Pool operations were apparent in Studebaker which advanced several points during the week on reports that the Corporation's new models were meeting with success. Production has been stepped up to close to capacity levels and all indications point to a good showing in earnings for the third quarter.

Hudson was under pressure on reports that the production schedule has been temporarily revised downward to a basis of 900 cars a day, but the stock recovered easily with the balance of the list.

Dodge Brothers likewise was under pressure, but pool buying rapidly carried the price back to former levels.

U. S. Rubber continued to feature the rubber group, holding steadily at around former levels. Goodrich, Goodyear and Fisk were also strong on reports of large tire business during July and August.

In the accessory group, offerings in Stewart-Warner continued at concessions on reports that a pool in the stock was liquidating. Officials state that business has been holding up well since the end of the first half and was somewhat better than normal with no apparent reason in the company's affairs to account for the weakness of the stock. Timken Roller Bearing was a strong feature of the accessories due to the company's good earnings gain in the first six months of the year and plans for expanding its business. Outlook for the second half is said to be good with predictions that earnings for the year will be around $8 a share.

Brokers are again urging discrimination in the purchase of the motor shares due to the fact that some of the leading companies are clearly gaining at the expense of others. In this connection the statement by John N. Willys on his return from Europe attracted some notice. Pointing out that he looked for decidedly good motor business, he called attention to the inevitability of intensified competition and the fact that a "survival of the fittest period" was in the offing.—E. S.

Bearings Feature New Machine Tools

New Haven Exhibit Shows Extension of Anti-Friction Design Principle

NEW HAVEN, CONN., Sept. 7—The Sixth Annual New Haven Machine Tool Exhibition opened here today with a representative list of exhibitors and a good attendance. As in previous years, the show is being held in the Mason Laboratory of Mechanical Engineering of Yale University, and most of the machines exhibited are being demonstrated in operation. All of the heavier machines are being shown on the main floor, but there are exhibits also in the basement and on the second and third floors. There are 67 companies occupying space on the four floors, and practically all of the available space is taken up.

The exhibits on the main floor impress the fact that production machinery is becoming more and more automatic—that with the majority of the machines practically all that remains for the operator to do is to load and unload them. From the fact that most of the important ball and roller bearing concerns in the country have exhibits at the show it is obvious that anti-friction bearings have come to be widely used in machine tools. Most of the newer automatic lathes and similar machines with "geared heads" have all of the shafts with the exception of the main spindle mounted on anti-friction bearings. Tool designers seem to be somewhat skeptical as to the adaptability of anti-friction bearings at these points, because the spindle must at all times be supported rigidly if the work turned out is to be accurate. This attitude, however, would seem to be due chiefly to unfamiliarity with the properties of anti-friction bearings.

Bearings on Main Spindle

A lathe in which even the main spindle is mounted on ball bearings is being shown on the stand of S. K. F. Industries, Inc. It is an 18-in. geared head lathe made by the Cisco Machine Tool Co., Cincinnati, Ohio. The main spindle is 3 9/16 in. in diameter and is supported in Hess-Bright deep groove bearings of the precision type. All other important bearings of the lathe also are of the Hess-Bright deep groove type. S. K. F. Industries also show ball bearing change-over shafts for Brown & Sharpe, Landis and Norton countershafts.

Right at the entrance to the main floor, the Keller Mechanical Engineering Co. of Brooklyn, gives a demonstration of its BL type tool room milling machine with jig boring attachment. The accuracy of the machine is shown by means of two cast-iron plates which have five jig holes drilled in each of them—one at the center and the others at the corners of a square. The accuracy of the square is shown by the fact that cylindrical plugs, which are an accurate fit in the holes, will pass through the holes of both plates no matter how the corners are matched up.

The New Britain Machine Co. shows its six-spindle automatic screw machine in operation turning out nut blanks from hexagon bar stock at the rate of 1500 per hour. The No. 12-A automatic chucking machine has been provided with a lead screw which permits of tapping accurately to depth. This is demonstrated on a brass chandelier loop, of which 1500 per hour are turned out. The New Britain Newmatic chucking machine is being demonstrated finishing up automotive valve guides. These have previously been turned up at one end in an automatic lathe, and in this machine they are turned and chamfered at the opposite end, drilled, rough-reamed and finish-reamed. The time for the complete operation is 25 seconds.

Tool Operations Shown

At the stand of the Heald Machine Co. the Heald Size-Matic is being demonstrated in internally grinding the inner races of ball bearings.

The Cincinnati Milling Machine Co. shows both its milling machine and its centerless grinder, the latter operating on twist drills which are being ground with a slight back taper.

Turret lathes are being shown by Acme Machine Tool Co., Bullard Machine Tool Co., and Warner & Swasey Co., while automatic screw machines are being shown by Brown & Sharpe Mfg. Co., Cleveland Automatic Machine Co., National Acme Co. and New Britain Machine Co. There are also numerous exhibits of lathes, drilling machines, presses, etc. In the basement welding equipment is shown by the Air Reduction Sales Co. and the Oxweld Acetylene Co., while the New Haven Gas Light Co. is exhibiting a variety of industrial furnaces.

Hold Technical Sessions

The show is being held under the joint auspices of the American Society of Mechanical Engineers, Yale University and the New Haven Chamber of Commerce. The A. S. M. E. is holding a number of technical sessions at New Haven this week at which subjects of interest to machine tool builders and users will be discussed.

Franklin Has New Service

SYRACUSE, Sept. 7.—Franklin Motor Co. is now offering a yearly service contract in connection with all sales of Franklin cars. Under the contract the owner is relieved of all responsibility relative to the care of the car during the year. Instead the dealer service station makes regular inspections.

Ford Cars in Lacquer

DETROIT, Sept. 7.—Ford Motor Co. is now finishing all models in lacquer in several color combinations. For the past several months the company has been building part of its production with the lacquer finish.

Tetraethyl to Save Consumption of Fuel

Chemical Society Told 3,000,000,000 Gallon Reduction is Possible Annually

PHILADELPHIA, Sept. 8.—Addressing the convention of the American Chemical Society in session here this week, Irenee du Pont, retired president of the E. I. du Pont de Nemours Co., said within a few years the addition of small, inexpensive quantities of tetraethyl lead to gasoline would bring about a saving of approximately 3,000,000,000 gal. of fuel yearly. Changes in the design of automobiles will be necessary, he said.

Discovery of a new octane and the building up with this chemical compound of a standard anti-knock, by which the worth of any anti-knock can be tested, was reported to the petroleum division of the society by Dr. Graham Edgar, director of research of the Ethyl Gasoline Corp. The new octane, he said, is very closely related to gasoline, but its anti-knock properties are greater than any fuel now known.

Dr. James F. Norris, president of the society, told of seeing recently a drop of colorless oil, in the laboratory of Dr. S. C. Lind, which had been formed from methane, the chief constituent of natural gas. This drop, he said, meant a supply of combustible liquid which would run automobiles when the petroleum supply is exhausted. This can be made from carbon and hydrogen when the supply of natural gas fails.

State Survey Indicates 100 Per Cent Car Growth

WASHINGTON, Sept. 7—There will be twice as many motor vehicles registered in Connecticut in 1930 as there were in 1925, according to estimates based on a survey of motor transportation on the highways of that State made by the Bureau of Public Roads, Department of Agriculture, in co-operation with State authorities.

From the data gathered in connection with comparison of rail and truck tonnage, the survey engineers conclude that a very considerable part of the package freight between origins and destinations in Connecticut territory less than 50 miles apart, is transported by motor truck. The ratio of motor truck freight to rail freight varied so widely, however, that it was difficult to strike a general figure. Cities which are distributing points for large surrounding area receive much more carload lots of freight than cities which distribute to the local market alone.

Other information developed by the survey includes: 1—One-third of the loaded motor trucks observed on the highways were overloaded; 2—Of all passenger cars on the highways, 44.5 per cent are business and 55.5 per cent non-business cars.

Bay State Reduces Car Liability Rate

Compulsory Insurance Law Provides Savings of 5 to 25 Per Cent for Owners

BOSTON, Sept. 7—The new automobile liability insurance rates to be adopted by Massachusetts insurance companies in connection with the new compulsory insurance law which becomes operative in that State next January, are from 5 to 25 per cent lower than the existing rates for the same types of coverage. The rates were fixed by the Commissioner of Insurance, who made them public last week, in accordance with the provisions of the statute.

The new rates were a distinct shock to the insurance companies, which had expected considerably higher rates than those announced. Most insurance officials believe their companies will lose money during 1927 on this class of insurance but expect a readjustment of rates in subsequent years.

A comparison of the new rates with the present rates is not possible with any degree of accuracy, due to the fact that the new insurance covers only cases of injury or death to persons on the Highways of Massachusetts, whereas most of the existing policies cover accidents which occur anywhere, and also cases where the damage is to property. Furthermore under the new rates there are only three insurance zones instead of the eight used for rating purposes at present.

Largest Decrease in Boston

Generally speaking, however, the new rates are, on the average, about 15 to 20 per cent lower than existing rates. The largest decrease is noted in territory No. 1, which takes in all of Boston and a number of suburban cities, such as Cambridge, Somerville, Medford and Chelsea. In this area, for instance, it costs $39 at present to insure a Ford car in Massachusetts. The new rate will be $29. An extra-territorial rate of $2 will give the owner coverage in any state. This extra territorial rate will apply on any car in any territory and remains the same.

In territory No. 3, which comprises the outlying rural districts of the State, this same decrease is pared down to but 5 per cent. In territory No. 2, which includes cities such as New Bedford, Fall River, Haverhill, Lynn, Lawrence, Lowell and Salem, the decrease from the existing rates is about 15 to 20 per cent.

The entire system of rating is radically different than that used at present. Under the new schedule the age of a car has no affect on the rate of insurance. Neither is there any difference in the rate given a touring car and that given a sedan. The rate is governed entirely by the make of the car and the territory in which it is registered.

FORD LETTER SAYS NO NEW CAR NEAR

DETROIT, Sept. 4—Letters from the Ford Motor Co. and signed Charles T. Lathers, were received by Ford dealers in Detroit and Michigan, last week, denying that the company intends bringing out a new model or altering the present line.

"There is no new Ford model coming along," read the letter, "there is no new Ford car to be introduced. These are facts, and the sooner they are firmly established, the better your business and our business will be.

"You have a job, we have a job, and that is to sell and service Ford products. The line was never so high in quality and low in price, it satisfies every transportation need, either merchandise or personal.

"Now let this letter completely clear the atmosphere and let's get everybody on the job to increase our volume to the point that we rightfully believe conditions warrant us to have."

Truck owners received a blow in the new rates inasmuch as they will be refused so-called fleet insurance, which has been ruled, by the Attorney General, discriminatory, and hence, against the new law. Rates for commercial vehicles are divided into a large number of classes and are, on the whole, slightly less than existing rates.

A summation of the new rates and a survey among motorists reveals that, on the whole, they are pleasing to motorists generally and displeasing to the insurance companies. They are considerably lower than even the most optimistic motorists expected and little dissatisfaction over them will be forthcoming from automobile owners. The insurance companies, while manifestly displeased, have no alternative but to accept the rates.

Morris Reduces Prices and Redesigns Models

LONDON, Sept. 6 (*by cable*)—Price reductions have been made by Morris on 1927 models, the new prices, however, not including the former free insurance features, and also involving extensive alterations in the chassis and in bodywork. The lowest 12 hp. phaeton with rear brakes is now £158 as against the former price of £182 with free insurance and more equipment. The sedan is reduced from £235 to £195. The biggest reduction is on the 14 hp. sedan which is down to £265 from £350.

The new cars have an entirely new radiator superseding the former V front type. The preliminary announcement says the frame has been completely redesigned, with new springing and the brakes have been improved.

Stearns to Retail New Daimler Here

Arrangements Made by John N. Willys on European Trip —Sees Relations Good

NEW YORK, Sept. 8.—Returning from Europe where he made an intensive study of trade conditions in England and on the continent, John N. Willys, president of Willys-Overland Co., said that trade relations between European countries and the United States are on a sound basis and there is every likelihood of their continuing so.

While in Europe Mr. Willys arranged for the exclusive sale in the United States by the F. B. Stearns Motor Co., of a new Daimler Knight sleeve valve motor car of 180 hp. The car is described by Mr. Willys as the most powerful stock car ever built. It will be shown for the first time at the Paris salon and later at the Olympia show in London.

Describing the car further, Mr. Willys said it is fitted with the most powerful brakes and in addition has a new mechananism that makes it possible to stop the car quickly at any speed by the pressure of one finger. It is a luxurious type car, Mr. Willys said, and will be popular with the few who are able and willing to spend $17,500 for a motor car.

Moon Takes Over Plant to Build All Own Bodies

ST. LOUIS, Sept. 8.—Moon Motor Car Co. has acquired part of the building and manufacturing facilities of the Moon Bros. Mfg. Co. to which it will transfer its painting and trimming operations. In the near future, the buildings will be equipped for the manufacture of all the closed body requirements of the company, according to Carl Burst, vice-president and works manager. Bodies will be built at the rate of 2500 a month.

As reasons for the manufacture of its own bodies, the company points out that the labor and lumber market of St. Louis is advantageous, and that cheapness of transportation by water over the Mississippi River and proximity to timber lands, makes economies possible which are necessary for the manufacture of cars at prices at which the Moon is offered.

Stewart Shows August Gain

BUFFALO, Sept. 4—Orders received by the Stewart Motor Corp. in August showed a 57 per cent gain over August last year and outlook for truck business in September and for the balance of the year is declared very favorable by T. R. Lippard, president and general manager.

G. W. K. Gets Imperia Right

LONDON, Sept. 1 (*by mail*)—G. W. K., Ltd., Maidenhead, Berks, have completed negotiations with Automobiles Imperia, Liege, Belgium, to manufacture the slide-valve-engined 10 hp. Imperia.

Night Flying Possibilities Told at Aeronautic Meeting

(Continued from page 414)

signed so that signals can be sent out in any desired direction. The method used is by means of two loops at an angle to each other, over one of which the "a" signal, a dot and a dash, and over the other one an "n" signal, a dash and a dot is sent out. These signals are so timed by means of a cam mechanism that on the bisecting line between the loops the signals interlock so that only a continuous dash is heard. By using a directional transmitter, the need for a directional receiver in the airplane is obviated, and an ordinary receiving set, usually of the heterodyne type, can be used. If the pilot gets off his course to one side he will hear an "a" signal which becomes more clearly defined the further he gets away from the correct course, while on the other side of the course the same is true, an "n" signal being heard.

POSITION finding is an application of direction finding, because the position of an object can be determined on a chart as soon as its direction from two or more known points has been determined. This statement was made by Capt. W. H. Murphy in his paper on "The Stationary and Rotating Equisignal Beacon." He said in part:

Direction finding, which is of the utmost importance in air navigation, can be classified into two groups: (*a*) the determinations are made entirely in the aircraft; this immediately, but not necessarily, implies the presence, with his equipment, of a navigator capable of operating radio apparatus, or an additional operator; (*b*) the determinations are made at special ground-stations, from which the bearings or position are transmitted to the aircraft; this system implies the use of transmitting of and receiving apparatus, an operator on the aircraft, and a trained staff on constant duty on the ground.

In the first group, the general procedure is one of the following: (*a*) The aircraft may be equipped with rotatable or fixed loops, Robinson coils, or a fixed goniometer; if the craft is small, only fixed loops or fixed Robinson coils can be used. The operator or navigator listens to a station, obtains the bearing, makes corrections from a chart that takes into account the errors caused by metallic parts of the aircraft, and determines the location of the station from a call-book.

(*b*) The aircraft may be equipped with simple receiving apparatus and antennae instead of the more intricate direction-finding equipment. In this case, rotating directional-signals are sent out from certain ground-stations, or beacons, having characteristic calls that are followed by directional signals rotated, for example, in 10 deg. steps and at a constant speed. The procedure in this case would be to listen to one of these stations and determine the bearing by noting the numerical position of the strongest signal, the position of which would give the bearing. If the beacon is a terminal station, it need not rotate at all, but should be set on the course so that it could be used as an accurate guide.

FOLLOWING is an abstract of the paper presented by Messrs. H. C. Ritchie and C. T. Ludington, on "Lighting of Airways, Airports and Airplanes":

The greatest advantage to be gained by night flying is in the utilization of time which is ordinarily not used for business. Night flying also makes possible universal and continued air transportation. The success of the United States Air Mail Service in its night operations warrants the assertion that lighting equipment on the airways is an absolute necessity.

The requirements of airway lighting are that there be provided light on the ground which will give the pilot a distinguishable landmark. Perhaps this means that eventually small lights will be placed on the ground about 1000 feet apart along the entire airway. The present system uses the 24-in. incandescent 7,500,000-c.p. beacon at approximately 10-mile intervals mounted on 53 ft. steel towers. The construction and operation of the beacons are described.

In addition cluster beacons consisting of four automobile headlamps surmounted by a top lamp are used. It has been the practice for the Air Mail Service to station the 24-in. beacons at emergency landing fields and in addition, 2-c.p. boundary lights placed about 250 feet apart around the field.

The principal requirements of a well-lighted airport are: (a) A beacon indicating the location; (b) Boundary markers; (c) Red obstruction lights; (d) Sufficient light on the ground; (e) Floodlights for hangars and other buildings. A green globe is sometimes used where favorable approaches exist.

Mr. Ludington in the second part of the paper after discussing the early work of the B. B. T. Corporation described the B. B. T. 180-degree floodlight which throws out a beam with a vertical divergence of but 1½ to 2 degrees. The beam is parallel to the ground, the upper surface is low and the cut-off is very sharp. A semi-circle with a radius of ½ mile is illuminated satisfactorily, eliminating glare and shadows to a large degree. With the bottom of the beacon adjusted so as to be parallel with the surface of the water, night landings on water are as simple a problem as on land. Gas and electric flashing-beacons as intermediate light-sources between fields are also described. The B.B.T. Corporation is experimenting on small floodlights for fields with an undulating surface.

Two recent new units have appeared. The B. B. T. type has a spherical mirror supplemented by two 180-degree circular parabolic mirrors above and below the lens which add somewhat to the efficiency by utilizing some light from the source that would otherwise be wasted. The light source consists of a 1000-watt lamp. The General Electric Co. unit is similar but has no parabolic reflectors. It is understood that the Sperry Gyroscope Co. has produced a similar unit recently. For temporary use on large fields a battery of four small floodlights mounted on a light hand truck is available.

THE following is an abstract of the paper presented by Wesley L. Smith on "How I Fly at Night":

Every route presents its own problems for night-flying, and the special methods used on the New York-Cleveland night trail will not be effective between any other two points. On the New York-Cleveland route beacons on emergency fields revolve in one direction and those on mountain tops revolve the opposite direction, being also surmounted by a red light as a further distinction.

Each terminal and emergency field is bounded by lights about 250 feet apart. At terminal fields all near obstacles are mounted by red lights; and best approaches are indicated by green boundary markers. Terminal fields are each equipped with a floodlight. For landing on emergency fields, the ship is equipped with two large landing lights, but usually a parachute flare is dropped before landing. The distance between beacons averages about 8 miles and between fields about 17 miles. The emergency fields are close together because safe landings other than on those fields are not possible at night except by parachute flares.

The special night equipment for planes consists of three navigation lights, to enable a pilot to see other ships en route, two large head-lights for landing in emergency fields which have no floodlights, and two parachute flares.

The easiest season is summer. Rain itself is no bar to visibility but is usually accompanied by fog and low clouds. Summer thunderstorms are usually only local, although they are very rough for flying. Autumn brings longer and more severe thunderstorms and thicker fogs than summer, but not as frequent. Visibility in a snowstorm is poor. Usually straight down is all that one can see. Snow on the ground, however, is a very great help in flying, although deep snow on landing fields prevents their use. The greatest of all problems is ice. Between the freezing point and ten degrees above zero moisture in the clouds will freeze onto the plane until it is forced down. Below 10 degrees Fahrenheit the clouds do not freeze onto the ship. Ice coats the wires to three times their usual size. It coats the propeller unevenly, thus unbalancing it, and the resulting vibration sometimes snaps wires before the ship is overloaded. Spring brings snow squalls and much sleet which freezes onto the planes causing many forced landings and much fog. Alternate thawing and freezing makes fields soft.

Tire Makers Reach New Record Output

Practically All Companies Now at Capacity—Continuing Heavy Sales Foreseen

AKRON, Sept. 4—Goodyear Tire & Rubber Co. during August broke all records for automobile tire and tube production, when output was 1,060,000 casings and 1,950,000 tubes, a gain of about 30 per cent over the low point of operations this spring. Average daily production has been at the rate of approximately 45,000 tires.

Other companies reporting new high records for tire production during the month include Goodrich, Firestone, Miller, General, Seiberling, Mohawk, India, Mason and Star. In the Akron district close to 3,400,000 tires were manufactured in August, it is estimated, compared to about 2,500,000 several months ago. Daily production has been nearly 130,000 tires.

Statements today of L. C. Rockhill, sales manager of Goodyear, and William F. Pfeiffer, general manager of the Miller Rubber Co., indicate that continued heavy sales are expected during the remainder of the year.

"Despite difficulties due to fluctuations in the price of crude rubber, volume of business handled by the industry during 1926 probably will exceed any previous year on record," says Mr. Rockhill.

"Sales are expected to reach nearly $1,500,000,000, against $1,250,000,000 in 1925. Tire sales to automobile manufacturers should exceed previous years. It is estimated that tire dealers will sell from 40 per cent to 50 per cent more tires in the last half of 1926 than they did in the first half." Mr. Pfeiffer predicts that 60 per cent of the year's total tire sales will be made in the last half year.

Increased Tire Business Prompts Plant Expansion

AKRON, Sept. 4—Expansion of present plant facilities is planned by several of the medium sized and smaller tire manufacturing companies, which have experienced an unprecedented growth in sales this year.

Mohawk Rubber Co. officials are planning to enlarge considerably their present plant, it is understood, to enable a 50 per cent increase in production.

President J. M. Alderfer, of the India Tire & Rubber Co., announces that a factory addition, 36 x 80 ft. will be built to meet the demands of increased business. The structure will be used for storage of raw materials, releasing space in the present factory for production purposes.

Although less than five years old, Seiberling Rubber Co. has been making rapid strides, and 1926 sales and production will exceed all former records. The company completed a factory addition last year.

LOANS OUTSTANDING INCREASE $694,000,000

WASHINGTON, Sept. 2—An increase of $694,000,000 in the amount of loans outstanding Aug. 25, as compared with the same date last year, is noted as an index of America's industrial prosperity in a report of the Federal Reserve Board. The total outstanding loans on Aug. 25 were $14,069,245,000. An increase of $4,000,000 in the week ended Aug. 25 was noted.

During the year, American capital increased its holdings in investments by $144,000,000, all of it in private and semi-public bonds as government securities declined $42,000,000 in the period.

General Tire & Rubber Co. started operations in a new factory addition early this year, and all units are now running at full capacity. Volume of business is expected to reach $25,000,000 this year, against about $18,000,000 in 1925.

Thompson Products Enjoys Largest August Business

CLEVELAND, Sept. 8 — Thompson Products, Inc., reports a production of 1,700,000 pieces during August, the greatest production for this month in the history of the plant. This does not include the Detroit plant which makes starting cranks, drag links, tie rods and other tubular automotive parts. The production of the Cleveland plant is confined to valves, bolt and bushings.

C. E. Thompson, president of the company anticipates continuance of a high production rate during the fall period, which until last year marked a sharp drop in volume. He attributes the increased business to changes in manufacturing and selling policies which are maintaining a more constant level of car sales during the year. He believes that the ever increasing tendency toward closed cars is distributing sales more evenly through the year.

Demand Normal in India

WASHINGTON, Sept. 8 — A cable from Calcutta, India, to the Automotive Division of the Department of Commerce states that the automotive demand is normal, with an excellent outlook and that good roads propaganda is spreading. In a recent address, the Minister of Finance expressed hope of reducing the import duty on motor vehicles to aid "the economic welfare of India."

Oakland Has 906 Day

PONTIAC, Sept. 4—The Oakland Motor Car Co., last week shattered all previous production records for a single day when 906 Oakland and Pontiac automobiles were built. The former mark was 843 cars in a day.

When the Pontiac was introduced, last January, daily production was 60 units a day.

Finance Convention Invites All Views

Non - Member Companies to Participate—Used Car to be Leading Topic

CHICAGO, Sept. 6—A policy inviting an open airing of views on all phases of automobile financing is to mark the first day's meeting of the convention of the National Association of Finance Companies to be held in Chicago Nov. 14-15, according to C. C. Hanch, general manager of the association, who is making preliminary arrangements for the forthcoming gathering.

The first day's session will be open to non-members as well as members and it is intended to extend to non-members in attendance the same forum privileges that will be accorded to members. "We are anxious to give everyone an opportunity to be heard," said Mr. Hanch, "and as our movement is primarily educational we deem it proper to open the door widely the first day, reserving the second day for the strictly membership meeting. Finance companies both in and out the association are closer together in general attitude now than at any previous time and hence we look for the freedom of this first day's sessions to do much toward furthering mutual understanding. We are very anxious for non-members to speak their thoughts at this meeting."

Promising all sessions an abundance of ammunition, Mr. Hanch will write each member of the association in advance inviting the suggestion of subjects for discussion and resolutions for debate. One of the subjects sure to be especially noticed is the used car situation, the meeting promising interesting light on causes of repossessions and the effect of repossessions on the used car market. Legislation also will come in for liberal treatment as will such usual angles as down-payments and maturities and other features of the finance business.

Manufacturer Films Ready for A. E. A. Sales Campaign

CHICAGO, Sept. 4—Arthur R. Mogge, merchandising director of the Automotive Equipment Association, announces that the following manufacturers have completed their "still picture films" for use in the A. E. A. merchandising campaign and are prepared to furnish prints to jobbers:

Bastian Blessing Mfg. Co., Brunner Mfg. Co., Champion Spark Plug Co., Hutto Engineering Co., Protexal Co., Rees Mfg. Co., Sparks-Withington Mfg. Co., Thompson Products, Inc., Weaver Mfg. Co. (2 films), Whitaker Battery Supply Co.

Additional manufacturers who have about completed their films are: David Lupton Sons Co., J. C. McAdams Co., New Era Spring & Specialty Co., Packard Electric Co., Spencer-Smith Machine Co.

San Francisco Acts to Create Air Port

SAN FRANCISCO, Sept. 7.—Negotiations for the purchase by the city of San Francisco of a tract of land south of the municipality, and the establishment there of a municipal airport are well under way, under the joint direction of the Public Utilities, Public Welfare and Streets, and the Commercial committee of the Board of Supervisors of San Francisco county, which is co-territorial with the city.

Joseph J. Philipps, city right-of-way agent, has been instructed to obtain options on suitable sites. The 1926-27 budget provides $100,000 for the acquisition of land for such a purpose and construction of first buildings thereon. The actual purchase has been held up by doubt as to whether the city had authority to make such purchase without a charter amendment, but this has been cleared up by classifying the project as a public utility, inasmuch as the government mail planes will use the municipal airport as a terminal.

The city will present a proposition to the Federal Government looking to joint operation of the airport.

South Africa Buys Tools

WASHINGTON, Sept. 8—The South African market for garage and automotive servicing equipment should improve materially with the changing outlook of the local garages and service stations, a foreign trade bulletin of the Department of Commerce announces. Lines which formerly were difficult to sell are all being considered more favorably and tools, garage equipment and labor saving devices generally are receiving more attention, the announcement states. Sales resistance in this territory will be found to be generally stiff, and the first requisite is local representation.

Coming Feature Issues of Chilton Class Journal Publications

Sept. 15—Commercial Car Journal. Annual Bus Issue

Sept. 30—Automotive Industries. Annual Production Issue

6-Cylinder Bus Chassis to Feature Mack Exhibit

NEW YORK, Sept. 7.—A new six-cylinder bus chassis will be the feature of the Mack exhibit at the coming Cleveland show of the American Electric Railway Association. Among the features are complete rubber shock insulation of the engine and transmission, which latter is mounted amidships. The springs also are mounted in rubber insulators. A new design of hood is employed and a clear-vision windshield of novel construction is fitted. The four-cylinder bus chassis with both mechanical and electric drive also will be exhibited as well as two special models designed for maintenance of way work by street railways. The last two are a wrecking truck and a tower wagon.

P. O. Uses 6982 Cars

WASHINGTON, Sept. 8—There are now 6982 automobiles, government owned and under contract for carrying mail, in the Post Office Department, figures just made public show. Air mail planes in 1925 flew 2,500,000 miles the figures also show, 14,145,640 letters being carried by the latest method of transportation.

There are in operation 45,314 rural routes, supplying 31,000,000 individuals. Rural carriers in 1925 travelled 1,234,153 miles daily and 337,650,871 miles during the year.

Germany Prepares Plans for Exhibition in 1927

WASHINGTON, Sept. 8—The long feud between German automobile manufacturers' associations, on the one side, and the dealers' association on the other, has been ended, a bulletin of the Automotive Division, Department of Commerce, announces. As a result of the truce, the much discussed international automobile exhibition planned for this year at Cologne has been abandoned. In its stead, plans are being made for an international special exhibition of trucks and specialized automobile vehicles outside of passenger cars, for next spring at Cologne, and a general international exhibition at Berlin in the fall of 1927. Both proposals are contingent on admission of Germany as a member of the "Bureau des Constructeurs d'Automobiles."

German Truck Sales Off

WASHINGTON, Sept. 8—While some revival in the German automotive trade was noticeable during the first half of 1926, imports of trucks and chassis are less satisfactory than those of passenger cars and are remaining far below the calendar year of 1925, Assistant Commercial Attache Douglas Miller at Berlin reports to the Automotive Division, Department of Commerce. Germany's imports of passenger cars are approximately four times her exports, but her exports of trucks almost equal imports.

Cadillac Calls Convention

DETROIT, Sept. 4.—The Cadillac Motor Car Co. has called a convention for all the maintenance managers of its organization in Detroit, Sept. 20 and 21. The sessions will be held in the convention hall of the company's new administration building. On the afternoon of the second day the visitors will be taken to the General Motors Proving Ground.

Calendar of Coming Events

SHOWS

Boston, Mass. .....Sept. 27-Oct. 2
Radio Exposition, Mechanics' Bldg.

Brussels .....Dec. 4-15

Buenos Aires .....Dec. 7-20
Ninth Argentine Automobile Show, Palermo Park.

Chicago .....Sept. 20-24
National Steel and Mechanical Tool Exposition, Municipal Pier, American Society for Steel Treating.

Chicago .....Sept. 27-Oct. 2
National Radio Exposition.

Chicago .....Nov. 8-13
Coliseum, Automotive Equipment Association.

Chicago .....Nov. 8-13
Accessory Exhibit Armory.

Chicago .....Nov. 15-19
Hotel Sherman, National Standard Parts Association.

Chicago .....Jan. 10-15
Coliseum, American Road Builders' Association.

Chicago .....Jan. 29-Feb. 5
National, Coliseum, National Automobile Chamber of Commerce.

Chicago .....Jan. 29-Feb. 5
Annual Salon, Hotel Drake.

Cleveland .....Oct. 4-8
Public Auditorium and Annex, American Electric Railway Association.

London .....Oct. 4-9
Olympia Motor Cycle.

London .....Oct. 21-30

Los Angeles .....Feb. 12-19
Annual Salon, Hotel Biltmore.

Milan .....Sept. 1-20
Exposition.

Milan .....Sept. 6-13
Fifth International Road Congress.

New York .....Sept. 13-18
Radio World's Fair, Madison Square Garden.

New York .....Nov. 24-Dec. 4
Annual Salon, Hotel Commodore.

New York .....Jan. 8-15
National, Grand Central Palace, National Automobile Chamber of Commerce.

Paris .....Oct. 7-17
Auto Salon, Grand Palais.

Paris .....Dec. 3-19
International Aeronautic Exposition, Grand Palais.

Prague .....Sept. 18-28

CONVENTIONS

American Electric Railway Association, Public Auditorium and Annex, Cleveland .....Oct. 4-8

American Road Builders' Association, Congress Hotel, Chicago .....Jan. 10-15

American Society for Steel Treating, Municipal Pier, Chicago.....Sept. 20-24

Associated Manufacturers of Fabric Auto Equipment, Inc., La Salle Hotel, Chicago .....Nov. 13

Automotive Electric Association, Delaware Water Gap .....Sept. 13-16

Automotive Equipment Association, Coliseum, Chicago .....Nov. 8-13

National Association of Finance Companies, Chicago .....Nov. 15-16

National Standard Parts Association, Hotel Sherman, Chicago.....Nov. 15-19

National Tire Dealers Association, Inc., Memphis, Tenn. .....Nov. 16-18

S. A. E. MEETINGS

National

Boston, Nov. 16-18, National Transportation and Service.

Chicago, Sept. 21-23, Production Engineering, Hotel Sherman.

RACES

Altoona .....Sept. 18
Atlantic City .....Sept. 25
Dallas, Texas .....Nov. 11
Laurel, Md. .....Oct. 23
Los Angeles .....Nov. 25
Salem, N. H. .....Oct. 13